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A STUDY TO ESTABLISH  
A MEASURE OF CLINICAL PRODUCTIVITY AMONG PHYSICIANS  
IN THE DEPARTMENT OF FAMILY PRACTICE OUTPATIENT CLINICS  
MADIGAN ARMY MEDICAL CENTER

A Graduate Research Project  
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of  
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by  
Captain Garland Kinslow, Jr., MSC

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## I. INTRODUCTION

### Conditions Which Prompted the Study

The present era of unprecedented medical care cost constraints in the United States, marked by government regulations, prospective payment systems and declining census has prompted health care administrators to search for new and innovative ways for their facilities to remain competitive, including expansion into ambulatory services. As each aspect of expense and revenue is closely scrutinized, provider productivity has become a subject of intensified interest to administrators. The health care organization's mission is focused on the provider, because he is both the customer and the revenue producer. In the civilian sector, the numbers on the organization's balance sheet are largely determined by provider-generated revenue and also by his use of the organization's resources as a consequence of his productivity. Provider productivity is of more immediate concern in the military health care environment, particularly in the ambulatory care setting, because of its direct impact on patient volume, appointment availability, patient satisfaction, and resource allocation.

Madigan Army Medical Center (MAMC), a major teaching hospital in the heavily populated Puget Sound area, will, like its civilian counterparts, benefit from the development of better measures to capture provider productivity than are currently in use. The foremost benefit, assuming allocation of resources is directly related to productivity, would be the development of a standard that would recognize the content and volume of outpatient care provider productivity in a realistic manner, and allocate resources accordingly. Of particular interest are those physicians specializing in family practice. In addition to their primary care role, they benefit the community by providing a comprehensive continuum of health care for patients and their families. Because family practice takes into account the social, physiological, economic, cultural, and biologic dimensions, this specialty includes care for a host of ailments that would otherwise involve treatment by physicians in other specialties. Ideally, those patients who must be referred to other specialties have been thoroughly screened to ensure that the referrals are appropriate, and are based on need. By implication, the relative level of productivity of family practitioners is of key importance at Madigan due to their multiple roles

as providers of primary and comprehensive care, and as a quality referral base for other hospital-based specialties.

Another key productivity-related concern lies in the Army Surgeon General's desire that every Army family have a designated primary care physician. The realization of such a goal addresses the issues of physician availability and accessibility to the family, and places an emphasis on the physician's abilities to diagnose, treat, and manage patients in an ambulatory clinic setting in a timely manner.

To date, the measures of physician productivity in ambulatory care have not been altogether satisfactory (Deguchi, Inui, and Martin, 1984). Clinic visits alone do not provide an accurate assessment of productivity. They ignore the inherent differences in the practice patterns of different specialties and they ignore case mix. In the civilian sector, a variety of alternative productivity measures which may address this problem have been proposed. Among the most promising are patient classification systems known as ambulatory visit groups (AVG) and diagnosis clusters. AVG criteria serve as the outpatient equivalent of diagnostic related group (DRG) criteria used in inpatient care settings. Ambulatory

visit groups define types of visits that are similar with respect to provider time spent in face-to-face contact (Fetter, Averill, Lichtenstein, and Freeman, 1984). AVG criteria have not yet been finalized, however, and the concept is undergoing rigorous study. The diagnosis clusters framework, one of the foundations upon which the AVG framework is being constructed, was originally designed with the primary purpose of analyzing the content of ambulatory medical care (Schneeweiss, Rosenblatt, Cherkin, Kirkwood, and Hart, 1983). With its continuing development, however, it presents the potential for use as a tool to analyze productivity as well as content. A more extensive discussion of these and other measures is presented elsewhere in this paper.

Until recently, little attention has been paid to capturing provider productivity in military outpatient clinics. However, a notable field research effort, sponsored by the U. S. Army Health Care Studies and Clinical Investigations Activity, is now underway. The Ambulatory Care Data Base Performance Measurement Study is being conducted at several U.S. Army hospitals and medical centers. Results of this study are expected to yield significant information pertaining to the development of an ambulatory care performance measurement

system (Begg, 1986). Adding emphasis to this area of endeavor is the Department of Defense mandate to implement in uniformed services medical facilities some kind of program to capture ambulatory care productivity in addition to implementing DRGs in the inpatient setting.

Productivity in the military environment is presently measured by Medical Care Composite Units (MCCU), which determine much of the operating budget provided to military hospitals. A new and innovative concept twenty years ago, this composite work measurement formula incorporated accepted elements of hospital care (admissions, live births, beds occupied, and clinic visits) and gave them a relative weight based on resources consumed by each element (Clement, 1984). According to MCCU criteria, a visit to a military outpatient clinic is awarded 0.3 MCCU, regardless of the amount of provider time and other resources consumed during the visit. At Madigan, a single MCCU, based on current productivity reimbursements, represents approximately \$24.00 in resource utilization. Thus, a clinic visit is awarded about \$8.00 for budget purposes. Such a system of capturing productivity obviously bears little relation to actual levels of resource utilization.

The achievement of a more precise productivity measure in the military setting, such as that suggested by AVGs, is important to military health care planners and administrators. Such a measure would determine the allocation of providers and other resources to clinics and hospitals, based on realistic, measureable criteria that would recognize the content and volume of outpatient care provider productivity. The patient community could benefit as well, in terms of increased availability and accessibility of providers, a more pleasant clinic environment, and providers who are not as rushed and can give more time to the patient, all of which contributes to patient satisfactory and quality of care. Such an achievement also holds promise of providing a realistic standard of productivity among providers within a clinical service at a single facility. Potentially, there also exists a basis of comparison of provider productivity among identical services at different facilities.

#### The Madigan Family Practice Program

The Army Medical Department operates six family practice residency training programs with approximately forty-five residents graduating annually. Of the 325

Army Medical Corps authorizations for family physicians, 135 are filled by graduate medical students (residents) (Todd, 1986). Training programs are situated at Eisenhower Army Medical Center, Ft Gordon, GA; Womack Army Hospital, Ft Bragg, NC; Martin Army Hospital, Ft Benning, GA; Silas B. Hayes Army Community Hospital, Ft Ord, CA; DeWitt Army Community Hospital, Ft Belvoir, VA; and Madigan Army Medical Center.

The Madigan Family Practice Department was established in 1972 as an outpatient care department staffed by board certified family practice staff physicians and family practice resident physicians. These physicians have admitting privileges in addition to their responsibility for the management of acute and chronic outpatient cases.

The mission of the department is twofold: first, to provide excellent outpatient care while encouraging patients to identify with one physician who provides them and their families with comprehensive primary care on a continuing basis. Second, to design and conduct a three-year postgraduate family practice residency training program which meets the requirements of the American Academy of Family Physicians Residency Review Board.

The department is currently staffed by seven board certified family practitioners, five senior (third year) residents, seven second year residents, and five first year residents (interns). Unlike most other specialties' residency programs, the department, in keeping with the teaching emphasis on the holistic approach and the development of patient relations skills, is augmented by a clinical social worker. Ancillary staff includes one registered nurse, four civilian licensed practical nurses, two 91A corpsmen, a 91B E-6 NCOIC, one secretary, two medical clerks (typing), three appointment/reception clerks, and a civilian department administrator.

The department functions under a decentralized appointment system, in which appointments are made directly within the department, personally or by telephone. Families' outpatient medical records are maintained within the department in a medical records room co-located with the department appointment and reception counter.

The department currently has responsibility for the development and operation of Madigan's Faculty Development Fellowship Program. This is a two year graduate program for physicians leading to a Master's degree in public health. There are four Fellows in the program, two entering the program each year.



Each physician in the Department of Family Practice is assigned a panel of families. The age mix and number of families are largely determined by the physician's level of training and the requirements of the Residency Review Committee for Family Practice as authorized by the Accreditation Council for Graduate Medical Education. The number of families empanelled to staff, Fellows, and resident peer groups is shown in Appendix A. Patient demographic data are shown at Appendices B and C. AMEDD family practice training program comparisons by institutions are shown in Appendix D. A department information brochure directed to families is shown in Appendix E. Availability of physicians for outpatient clinic visits is shown at Appendix F. The total number of clinic visits in the department for the months of May 1986 through April 1987 is shown at Appendix G.

Until recently, the department was a closed system in the sense that families were selected to become participants in the family practice program. Enrollment in family practice has been based entirely on voluntary applications from active duty and retiree beneficiaries contingent upon residency training needs. Because of its popularity, the number of volunteer families far exceeds the capacity of the program to accept them. This method

of selecting families will soon change significantly. Plans are now being implemented to incorporate all soldiers and family members assigned to the 593d Area Support Group into the Family Practice Program. A corps level organization, the 593d will represent an addition of some two thousand families to the Family Practice population. The assignment of families on a capitation basis will place some strains on the current staff, and staff increases are expected. This major policy decision is in keeping with the Surgeon General's desire to have a primary care physician designated for every Army family, and is greeted with applause by the 593d personnel.

#### Statement of the Problem

To conduct a study which will establish a measure of clinical productivity among physicians in the Department of Family Practice outpatient clinics at Madigan Army Medical Center.

#### Objectives

1. Conduct a review of literature concerning physician productivity in a family practice outpatient clinic.

2. Determine what constitutes physician productivity for the purposes of this study.
3. Devise a method of gathering patient treatment data.
4. Conduct a pilot study to assess the effectiveness of the chosen method and make adjustments accordingly.
5. Gather the data.
6. Determine a data base as a means of categorizing data in order to conduct statistical procedures.
7. Using statistical procedures, measure physician productivity based on the data gathered.

#### Criteria

Physician productivity as defined for this study will consist of the mean physician time spent in minutes in direct encounters with patients with similar diagnosis categories during a single outpatient clinic visit or encounter (mean encounter time). A direct encounter is a face-to-face meeting of the patient and physician. A direct encounter is the same as a visit (A glossary of primary care, p. 637). Incorporated into the encounter is time spent by the physician reviewing or annotating

the patient record immediately prior to or following the face-to-face session with the patient. Although this represents a departure from most measures of encounter time, it was determined that this time constitutes an integral portion of the visit.

#### Assumptions

1. The quality of care provided by all physicians whose productivity is studied is similar and satisfactory.
2. Sufficient ancillary personnel are available at the Madigan Department of Family Practice outpatient clinics to perform necessary screening and preliminary procedures, such as taking vital signs, relieving the physician of such tasks. Physician productivity is not hindered by lack of staff.

#### Limitations

1. The range of diagnoses reported will be a reflection of the characteristics of the patient population during the period that the study is conducted.
2. For comparison purposes, measurement of mean encounter times will be limited to a number (to be determined) of the most common diagnoses reported by the

physicians participating in this study (diagnoses common to all of the reporting physicians). The determination of the number of diagnosis categories considered will be based on the frequency of appearance of reported diagnoses.

3. The number of encounters will be limited by the number of hours physicians are available for outpatient visits during the course of the study.

#### Review of the Literature

"In order to compete in today's health care market arena, hospitals are moving to product (case type) management. Many methodologies are being researched, evaluated, and developed to provide a working system of ensuring product (disease treatment) output..."(Arbitman, 1986, p. 31). Along with new developments in productivity measurement in the inpatient setting, there is also the recognition that a measure specific to ambulatory care product output is necessary (Hoffman & Wakefield, 1986). As they seek new means to cut costs and increase market share, many hospitals in the civilian sector have diversified from their traditional acute medical-surgical inpatient care roles and created or expanded outpatient facilities offering increased numbers

of specialty clinics and the use of satellite facilities. Indeed, hospital-based outpatient care is the fastest growing component of any type of health care today (Lion, 1987). Increasing volume and case mix intensity in outpatient services mandate the development of effective mechanisms to improve the allocation and efficient use of resources.

The foremost characteristic most mechanisms have in common is that, rather than concentrating on process, they measure productivity based on patient classification as an analogue of output. A successful output-based patient classification system must be both precise and administratively useful. Arbitman (1986) neatly summarized the most important characteristics that any classification system should have. Those characteristics should include medical meaningfulness, that is, patients within each group should have similar medical attributes to be meaningful to clinicians. Another characteristic would be homogeneity, or similarity in terms of costs of treatment, treatment patterns, or some other predetermined factor. Statistical validity is essential if groupings are to be used for comparisons. For example, an analysis of treatment patterns should be based on a group of patients who are likely to have

received identical care. The system should be objective. Computerization of a classification system avoids the possibility of subjective assignment by individuals making the assignments. Availability of the data items used to categorize patients may be the determinant in the acceptability of a classification system to managers and clinicians. The use of ICD-9-CM codes as the basis of most systems is due to their proven availability and understandability by clinicians. According to Arbitman (p. 32, 1986), availability of data is a particularly noteworthy problem in the development of ambulatory patient classification systems, because, "accurate data on ambulatory care visits has lagged behind inpatient care collection."

While many management tools have been proposed, few are actually of proven worth in the measurement of outpatient productivity. Such methodologies as disease staging, severity of illness index, medical illness severity grouping system, and patient management categories were all designed specifically for use in the inpatient setting. They include variables unique to inpatient care, such as elements of nursing care and activities of daily living, which would be unsuitable in the measurement of outpatient care (Hoffman and Wakefield, 1986).

A number of outpatient classification efforts have been made, including the Kaiser Clinical-Behavioral Classification System, the Johns Hopkins Ambulatory Care coding Scheme, and the Reason for Visit morbidity scheme. Each has been found deficient for such reasons as its dependence on subjective measures, limited ability to relate case mix data to resource use, inadequate definition of resource use, or limited applicability (Fetter, Averill, Lichtenstein, and Freeman, 1984).

There are two major alternatives to consider in the development of an ambulatory care productivity measurement tool. One is to consider the care as related to a given episode of illness, and the other is to treat each visit separately. The visit-specific basis has received the most attention due to its comparative simplicity and its avoidance of the confusing aspects associated with defining episodes of illness. Additionally, the measure should recognize patients whose visits consume unusually high amounts of provider time (Martin, 1986).

#### Ambulatory Visit Groups

Among all the inpatient-oriented methodologies, diagnosis related groups (DRGs) has represented the



greatest potential for adaptation into a suitable framework for measuring ambulatory care productivity. Originally known as "outpatient DRGs" (Knapp, 1983), the DRG adaptation evolved into "ambulatory patient-related groups" (APGs) and then into its present identification, "ambulatory visit groups" (AVGs).

AVG criteria serve as the outpatient equivalent of diagnostic related group (DRG) criteria used in inpatient care settings. The AVG case mix classification system is based on a single visit, focusing on a single, primary diagnosis. Ambulatory visit groups define types of visits that are similar with respect to provider time spent in direct face-to-face contact with the patient (Fetter, Averill, Lichtenstein, and Freeman, 1984). The ICD-9-CM diagnosis classification system is used to categorize diagnoses for AVGs, as it does for DRGs. The second generation of AVGs is based on 19 major diagnostic categories, similar to the DRG format. These categories are further divided into 571 groups, encompassing ambulatory surgery procedures (classified by the CPT 1985: Physicians' Current Procedural Terminology, 4th Ed.) and tertiary high technology specialties as well as primary care. They are intended for use in any type of ambulatory setting, from a physician's private office

through primary health clinics and hospital outpatient departments to emergency rooms and ambulatory surgicenters (Lion, 1987). The original AVG based was the 1975-76 National Ambulatory Medical Care Survey (NAMCS). The second generation uses data collected from the 1979 NAMCS. The NAMCS is a standard national ambulatory care data base constructed and updated periodically by the U.S. Department of Health and Human Services. AVGs appear to satisfactorily meet most of the criteria discussed earlier as prerequisites for a successful classification system. Medical meaningfulness, objectivity, and availability are satisfied by the use of the ICD-9-CM codes. Homogeneity is addressed by the system's use of 19 major diagnostic categories and its linkage with diagnosis related groups. Statistical validity in terms of the measurement of physician time has yet to be ascertained, however, and it may be years before the system can be implemented with a high degree of reliability (Lion, 1987).

There is significant interest in government and industry in ambulatory visit groups. Funding for the development of AVGs began in the 1970s under a contract with the Social Security Administration. Subsequent development, which is ongoing, has been funded by the

Health Care Financing Administration. Because of the government's investment and interest in AVGs, and the AVG-DRG link, it is likely that this classification system will be selected for implementation as the ambulatory care productivity measure in uniformed services medical treatment facilities, possibly within the next two years.

#### Diagnosis Clusters

Among all measures developed from the outset as having their basis in ambulatory care, diagnosis clusters offers the most tantalizing possibilities. The diagnosis clusters framework, one of the foundations upon which the AVG framework is being constructed, was originally designed with the primary purpose of analyzing the content of ambulatory medical care, and not as a new diagnostic classification system (Schneeweiss et al., 1983). With its continuing development, however, it presents the potential for use as a tool to analyze physician productivity as well as content.

Like AVGs, diagnosis clusters consider only a single, primary diagnosis in a single visit. The diagnosis cluster framework, a case mix system as is the AVG system, also used the ICD-9-CM diagnosis

classification to categorize diagnoses. Diagnosis clusters are also compatible with the International Classification of Health Problems in Primary Care (ICHPPC-2) system. A major attraction of diagnosis clusters is the manner in which the unwieldy number of diagnoses found in ambulatory settings are aggregated into a manageable, yet clinically meaningful, number of homogeneous diagnosis categories. The basic group of 100 clusters decreases the number of diagnostic codes by an order of magnitude. The following criteria were observed in developing diagnosis clusters (Schneeweiss et al., 1983):

1. The clusters should identify groups of diagnostic rubrics that are clinically homogeneous. That is, each of the individual diagnostic rubrics within a cluster should ideally generate a similar clinical response from the physician in terms of the cognitive processes involved, the type of diagnostic tests ordered, the class of therapies ordered, and the general services rendered.

2. The clusters should be broad enough to encompass the great majority of the large number of discrete diagnostic rubrics that are used in ambulatory, office-based practice, yet precise

enough so they do not blur clinically meaningful distinctions.

3. The clusters should decrease the effect of the idiosyncratic diagnosis labeling patterns of individual health care providers by grouping clinically related conditions.

4. Related diagnoses with high aggregate frequency but low individual frequency should be included in the clusters.

5. The clusters should be applicable to any ambulatory setting by conforming to existing diagnostic classifications commonly used in office-based practice and adhering to their hierarchic structure, namely ICD and ICHPPC.

6. The clusters should be independent of physician specialty. (p. 108)

Criterion number 4 deserves special mention. By grouping related diagnoses of low individual but high aggregate frequency, such as Cluster 10 (all fractures and dislocations), the clusters acknowledge those diagnoses that require similar cognitive processes as well as similar diagnostic tests and treatments, and bring them into prominence. Such a design facilitates comparisons of the content of practice.

Diagnosis clusters were derived from NAMCS 1977-78 survey data sets for all specialties and for general and family practitioners, and were validated against data from the 1977 University of Southern California Medical and Manpower Study (USC/MAMP) (Schneeweiss et al., 1983). The clusters were later compared against data from the 1980-81 NAMCS, in which 1,533 ICD-9-CM diagnosis codes were noted in visits to family physicians. Refinements resulting from this validation created the present version of 100 diagnosis clusters designed to cover all specialties plus an additional ten clusters to record high-frequency diagnoses recorded by family physicians. The 110 clusters encompassed 90% of all primary diagnoses recorded under ICD-9-CM in visits to family physicians. Diagnoses excluded from the clusters were those with a recorded frequency of 0.1 percent or less and those identified as falling in "other" residual categories in the ICD-9-CM (Schneeweiss et al., 1986). Further refinements could result in the transformation of a higher percentage of diagnoses into clusters, encompassing rarer conditions, since the cluster framework adheres to the ICD structure. Diagnosis clusters have been used in studies to analyze the content of family practice programs in a large municipal medical

center with satellite clinics (Shear & Wall, 1985), as well as in comparative studies using USC/MAMP, NAMCS, and Virginia Study data sets (Rosenblatt et al., 1982).

Diagnosis clusters have also been used to record mean encounter times as an indicator of quality of care. Data from the USC/MAMP survey were used to compare the encounter times of residency-trained v. non-residency trained family physicians. Rosenblatt et al. (1982) stated "the amount of time physicians spend with individual patients is thought to be related to patient satisfaction and may effect quality of care. It has profound effects on physician productivity" (emphasis added) (p. 699).

The diagnosis clusters framework appears to admirably meet the criteria set forth earlier in this paper. Indeed, medical meaningfulness, homogeneity, objectivity, and the use of a recognized and widely available diagnosis coding mechanism are the same objectives sought in the development of the clusters. Statistical validity would appear to have been achieved through the wide use of the clusters in other studies.

### Research Methodology

After a review of the literature, it was determined that the diagnosis clusters rubric constituted the most appropriate diagnosis categorization mechanism for this study. Much work is already being done with ambulatory visit groups, and the AVG criteria are significantly more complex than the diagnosis cluster criteria. The literature revealed no cases in which diagnosis clusters were used to analyze encounter times in the military health care setting. Thus, the opportunity existed to venture into uncharted territory, and perhaps offer an alternative or adjunct measure of productivity to those already under consideration for implementation in Department of Defense medical treatment facilities.

For purposes of conducting statistical comparisons, the problem statement is reformulated to reflect the following research questions:

(1) Is there a significant difference, among all physicians, in encounter times between diagnosis categories?

(2) Is there a significant difference in encounter times, by diagnosis categories, between physician groups (levels of training)?



All staff, Fellows, and resident physicians assigned to the Department of Family Practice were designated to participate in this study, with the exception of first-year residents (interns), whose training requirements minimize the amount of time available for outpatient care in the family practice clinics. Of the remaining physicians, it is believed that to have selected a sample from their number, rather than to include the entire staff, would have jeopardized the statistical validity of the study. Fellows were grouped with staff physicians due to the fact they they were all board-certified family practitioners and had teaching responsibilities in the department, as did the staff.

It was determined that encounter data would be collected on a concurrent basis for a period of one month. The determination to collect concurrently, rather than retrospectively, is based on the recognition that critical measures of actual encounter times are not normally included in appointment or medical records. During the survey period, participating physicians were requested to record all clinic visits in order to capture the greatest number of possible diagnoses and visit episodes.

Physicians were identified for survey purposes only by an I.D. number (already assigned to physicians by the department for other survey purposes). Physician demographic data was provided by the physicians as shown in Appendix H, Physician Registration Form, and returned to the Department of Family Practice administrative office. The data requested on the form had been approved by the department chief.

It was necessary to construct a standard data collecting instrument to record encounter data and print a sufficient number of copies to provide all physicians participating in the study with a sufficient supply. Encounter data was collected as shown in Appendix I, Family Practice Physician-Outpatient Encounter Form. This form was approved by the department chief.

A two-day pilot study was conducted in March 1987 to refine the encounter forms and data collection procedures. After minor modifications were made, it was determined that the survey was feasible and had the physicians' interest and commitment.

The survey commenced in the Department of Family Practice outpatient clinics on 11 March and continued through 10 April 1987. The survey period encompassed twenty-three days. A supply of encounter forms was

stocked at the single reception counter, where all patients reported for their appointments. Upon the arrival of a patient for an appointment, clinic staff and volunteers at the reception counter completed the appropriate portion of the form and attached it to the outpatient record, which had previously been pulled from the records room in accordance with established procedure. Encounter forms were similarly prepared for patients who arrived as "walk-ins". The physician received the form together with the outpatient record, completed the appropriate portion of the form at the conclusion of the visit, and retained the completed form. Physicians also had a supply of blank forms at their desks for those occasions when a stray record would have no attached form, or a patient had no record. It was expected that the completion of encounter forms by the physicians would incorporate all of the time that the physician was available in the clinic for the purpose of conducting clinic visits. At the end of each day, the clinic nurse collected the completed forms from the physicians' offices and hand-carried them to the department administrative office.

Completed forms were collected from the administrative office and were hand-carried daily to the

Directorate of Patient Administration, which had agreed to participate in the study. There, coders assigned a ICD-9-CM diagnosis code to the primary diagnosis noted on each encounter form.

The investigator collected the coded forms, then assigned each form a diagnosis cluster number corresponding to the ICD-9-CM code. The annotated forms were taken to the Madigan Department of Clinical Investigation (DCI), and the data from the forms were input into a Lotus Symphony spreadsheet running on a DCI IBM AT computer at DCI. A separate Symphony spreadsheet was constructed for the physician demographic data which had been collected at the beginning of the survey.

Statistical calculations were performed through the use of the SPSS PC+ (Statistics Package for the Social Sciences) software on the IBM AT. The Lotus Symphony spreadsheets were merged and incorporated into the SPSS program. SPSS programming assistance was provided by DCI staff.

It was determined that the appropriate model to address the research questions was the fixed effects model for the two-factor completely randomized design of analysis of variance. This model may be written as:

$$x_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + e_{ijk},$$

$$i = 1, 2, \dots, a; \quad j = 1, 2, \dots, b; \quad k = 1, 2, \dots, n$$

where  $x_{ijk}$  is a typical observation,  $\mu$  is a constant,  $\alpha$  represents an effect due to factor A (diagnosis category),  $\beta$  represents an effect due to factor B (physician level of training),  $(\alpha\beta)$  represents the interaction of factors A and B, and  $e_{ijk}$  represents the experimental error.

**Assumptions:**

(1) The observations in each of the  $ab$  cells constitute an independent sample of size  $n$  drawn from the population defined by the particular combination of the levels of the two factors. Since each encounter during the survey period will be included, data will not be drawn from random samples of encounters, thus assumptions concerning randomness are not addressed, other than to assume the encounters occurred in random manner.

(2) Each of the  $ab$  populations is normally distributed.

(3) Population variances are equal.

The research questions were set up as the following hypotheses:

$$(1) \quad H_0: \alpha_1 = \alpha_2 = \dots, \alpha_i = 0$$

$$H_A: \text{not all } \alpha_i = 0$$

$$(2) \quad H_0: \beta_1 = \beta_2 = \dots, \beta_j = 0$$

$$H_A: \text{not all } \beta_j = 0$$

$$(3) \quad H_0: (\alpha\beta)_{ij} = 0$$

$$H_A: \text{not all } (\alpha\beta)_{ij} \text{ are equal}$$

$$\alpha = .05$$

The test statistic was used to evaluate the observed difference between multiple samples, i.e., the difference in encounter times between multiple diagnosis categories, the difference in encounter times between physician groups (level of training), and the significance of any interaction between diagnosis categories and physician groups on encounter times.

Generally speaking, calculations for the type of problem discussed may be portrayed as:

$$SST = SStr + SSE$$

$$SSTr = SSA + SSB + SSAB$$

The formulae for computing this type of problem manually may be found in Daniels (p. 244-245).

Statistical Decision: The statistical decision will be based on the acceptance or rejection of the null hypotheses. If  $H_0: \alpha_1 = \alpha_2 = \dots, \alpha_j = 0$  is rejected, it may be concluded that there are differences among the levels of A, i.e., differences in mean encounter times attributable to diagnosis categories. Similarly, if

$H_0: \beta_1 = \beta_2 = \dots, \beta_j = 0$  is rejected, it may be concluded that there are differences attributable to B (physician level of training), in encounter times between physician groups. If  $H_0: (\alpha\beta)_{ij} = 0$  is rejected, it may be concluded that factors A and B interact, i.e., different combinations of levels of the two factors produce different effects. Duncan's Multiple Range Test was to be employed to test for significant differences in the event of rejection of a null hypothesis.

## II. DISCUSSION

### Survey Participation

During the period of the survey, the Madigan Department of Family Practice recorded a total of 3,085 clinic visits (direct physician-patient encounters). Of that number, 2,651 visits (85.9%) were attributed to those physicians who participated in the study. Encounter forms were completed for 1,459 visits during the survey period, which represented 47.3% of all direct encounters and 55.0% of the visits attributed to the participating physicians. The staff/Fellows, the senior residents, and the 2d year residents response rates were 53.1%, 57.7%, and 56.8%, respectively.

Among the staff, one physician, who had earlier expressed a great interest in the study, decided during the first week of the survey to decline participation for personal reasons. One of the four Fellows and one of the 2d year residents were involved in external rotations during most of the survey period and did not participate for that reason. The highest individual response rate was 70.6% for a PG3 physician, and the lowest (30.5%) was attributed to a Fellow. A total of 205 partially complete but unusable (missing diagnosis or encounter



TABLE 1. Summary of visit and response rates among family practitioners, Madigan Army Medical Center, Department of Family Practice, 11 March-10 April 1987

Physician Group	Number in Group	Number of Participants	Number of Visits	Percentage of Visits	Number of Responses	Percentage of Responses	Response Rate
Staff/Fellow	11	9*	1431	54.0%	760	52.1%	53.1%
PG3	5	5	685	25.8%	395	27.1%	57.7%
PG2	7	6*	535	20.2%	304	20.8%	56.8%
Total	23	20	2651	100.0%	1459	100.0%	X=55.0%

\*1 staff physician declined to participate; 1 Fellow and 1 PG2 were absent during the survey period.

time) encounter forms were collected in addition to the 1,459 forms included in the data base. The receptiveness with which many of the participants initially greeted the study was, in some cases, later countered by the reality of double-booked patients, forgetfulness, fatigue, ill temper, and external demands on their clinic schedules, but they continued to maintain an interest in the survey. During the course of the survey, frequent meetings with participant physicians, individually and as groups, were conducted by the investigator and the clinic chiefs. The participants were encouraged to continue to complete the maximum possible number of encounter forms. See Table 1 for a detailed summary of visit and response rates by physician groups.

#### Distribution of Diagnosis Clusters

Application of the family practice diagnosis cluster approach to categorizing diagnoses in the MAMC Department of Family Practice resulted in the categorization of 1,356, or 92.9% of the 1,459 recorded visits into a specific cluster. The 103 visits (7.1%) which were excluded from the clusters represented diagnoses with a total recorded frequency of less than 0.1% each and those identified as falling in "other" residual categories in

the ICD-9-CM. See Appendix J for the complete diagnosis cluster data base used in this study to categorize diagnoses.

Diagnosis cluster frequencies observed in this study were rank ordered in separate frequency distributions. One distribution included all diagnosis clusters recorded regardless of patient age, and the other distributions were identified by specific patient age classifications. It was determined that a single diagnosis clusters distribution would not be sufficient to accurately portray expected differences in frequencies between different age groups. Such information was of significant interest to the physicians who participated in the study, and a review of the literature revealed no previous studies in which diagnosis clusters were used in this manner. Due to the widespread use of the NAMCS data base as a standard for comparative studies, the NAMCS age classification distributions were used in this study. As expected, considerable differences were observed in the cluster frequencies from one patient age classification to another. In some cases a progression of disease with age was also noted. For example, hypertension, which was ranked number 4 at 6.2% of total encounters, does not appear in the under 15 year age group. In the age group

15-24 years, hypertension is observed in 2.1% of the encounters. It represents 4.1% of the encounters in the 25-44 year group, and 11.9% in the 45-64 year group. In the 65 years and older group, hypertension represented 14.3% of the recorded encounters.

The distribution of the most frequently observed diagnosis clusters is portrayed in Tables 2 and 3. The top 20 clusters overall are represented in Table 2. Table 3 portrays approximately 20 clusters per age classification. Portrayals were cut off at naturally occurring break points in the cluster frequency distributions for each age group. Diagnosis cluster identification numbers noted in the tables refer to the rank order given the cluster based on primary diagnoses for all office-based specialties, NAMCS 1980-81. Age classification was not considered in the assignment of the cluster rank order identification numbers. The reader is cautioned that the diagnosis clusters frequency distributions portrayed in this Madigan study should not be generalized. Factors relating to the patient population, geographic area, and time of year during which the data were collected may create variances in data collected at other locations or during different seasons, resulting in different conclusions.

TABLE 2. Number and percent distribution of direct encounters with family practitioners of 20 most frequent diagnosis clusters, Madigan Army Medical Center, Department of Family Practice, 11 March - 10 April 1987

Rank	Diagnosis Cluster Number & Title	Number of Visits	Percent Distribution
1	(1) General medical examination	126	8.6
2	(6) Otitis media	108	7.4
3	(3) Pregnancy care	97	6.6
4	(4) Hypertension	91	6.2
5	(2) Acute upper respiratory tract infection	83	5.7
6	(11) Acute lower respiratory tract infection	51	3.5
7	(9) Medical and surgical aftercare	44	3.0
8	(5) Depression, anxiety, neurosis	38	2.6
9	(8) Acute sprains, strains	29	2.0
10	(14) Diabetes mellitus	28	1.9
11	(15) Degenerative joint disease	26	1.8
11	(7) Lacerations, contusions, abrasions	26	1.8
13	(39) Emphysema, chronic bronchitis, COPD	24	1.6
14	(20) Chronic rhinitis	23	1.6
15	(32) Fibrositis, myalgia, arthralgia	23	1.6
16	(31) Sinusitis	21	1.4
17	(16) Dermatitis, eczema	20	1.4
17	(29) Asthma	20	1.4
19	(19) Urinary tract infection	19	1.3
20	(28) Vaginitis, vulvitis, cervicitis	18	1.2
Residual		544	37.3
Total		1459	100.0

TABLE 3. Number and percent distribution of direct encounters with family practitioners by patient age and most frequent diagnosis clusters: Madigan Army Medical Center, Department of Family Practice, 11 March - 10 April 1987

Rank	Diagnosis Cluster Number & Title	Number of Visits	Percent Distribution
Under 15 years			
1	(6) Otitis media	99	25.8
2	(1) General medical examination	49	12.8
3	(2) Acute upper respiratory tract infection	43	11.2
4	(11) Acute lower respiratory tract infection	23	6.0
5	(9) Medical and surgical aftercare	12	3.1
6	(7) Lacerations, contusions, abrasions	11	2.9
7	(101) Unspecified viral illness	10	2.6
8	(16) Dermatitis, eczema	9	2.3
9	(30) Diarrhea, gastroenteritis	7	1.8
9	(38) Conjunctivitis, keratitis	7	1.8
9	(54) Otitis external	7	1.8
12	(29) Asthma	6	1.6
12	(60) Abdominal pain	6	1.6
14	(10) Fractures, dislocations	5	1.3
14	(33) Viral warts	5	1.3
14	(100) Acquired curvature of the spine	5	1.3
17	(8) Acute sprains, strains	4	1.0
17	(103) Rash	4	1.0
Residual		72	18.8
Total		384	100.0
15-24 years			
1	(3) Pregnancy care	37	19.2
2	(19) Urinary tract infection	13	6.7
3	(2) Acute upper respiratory tract infection	11	5.7
4	(1) General medical examination	8	4.1
5	(8) Acute sprains, strains	7	3.6
5	(9) Medical and surgical aftercare	7	3.6
5	(28) Vaginitis, vulvitis, cervicitis	7	3.6
8	(36) Sexually transmitted diseases	6	3.1
9	(11) Acute lower respiratory tract infection	5	2.6
10	(4) Hypertension	4	2.1
10	(7) Lacerations, contusions, abrasions	4	2.1
10	(10) Fractures, dislocations	4	2.1
10	(12) Acne, sweat and sebaceous gland diseases	4	2.1
10	(31) Sinusitis	4	2.1
10	(37) Menstrual disorders	4	2.1
16	(32) Fibrositis, myalgia, arthralgia	3	1.6
16	(34) Headache	3	1.6
16	(38) Conjunctivitis, keratitis	3	1.6
Residual		59	30.6
Total		193	100.0

# 25-44 years

1	(3) Pregnancy care	60	19.6
2	(1) General medical examination	25	8.2
3	(5) Depression, anxiety, neurosis	19	6.2
4	(2) Upper respiratory tract infection	15	4.9
5	(4) Hypertension	13	4.2
5	(20) Chronic rhinitis	13	4.2
7	(11) Acute lower respiratory tract infection	10	3.3
8	(8) Acute sprains, strains	8	2.6
9	(28) Vaginitis, vulvitis, cervicitis	7	2.3
10	(7) Lacerations, contusions, abrasions	5	1.6
10	(21) Obesity	5	1.6
10	(27) Nonfungal skin infections	5	1.6
10	(31) Sinusitis	5	1.6
10	(54) Otitis external	5	1.6
15	(14) Diabetes mellitus	4	1.3
15	(29) Asthma	4	1.3
15	(34) Headache	4	1.3
15	(36) Sexually transmitted diseases	4	1.3
Residual		95	31.0
Total		306	100.0

# 45-64 years

1	(4) Hypertension	42	11.9
2	(1) General medical examination	30	8.5
3	(15) Degenerative joint disease	17	4.8
4	(5) Depression, anxiety, neurosis	12	3.4
4	(9) Medical and surgical aftercare	12	3.4
6	(14) Diabetes mellitus	11	3.1
7	(23) Bursitis, synovitis, tenosynovitis	10	2.8
7	(32) Fibrositis, myalgia, arthralgia	10	2.8
9	(31) Sinusitis	9	2.6
10	(13) Ischemic heart disease	8	2.3
10	(39) Emphysema, chronic bronchitis, COPD	8	2.3
12	(2) Acute upper respiratory tract infection	7	2.0
12	(56) Menopausal symptoms	7	2.0
12	(59) Congestive heart failure	7	2.0
15	(6) Otitis media	6	1.7
15	(11) Acute lower respiratory tract infection	6	1.7
15	(16) Dermatitis, eczema	6	1.7
15	(29) Asthma	6	1.7
15	(73) Chest pain	6	1.7
20	(34) Headache	5	1.4
Residual		127	36.1
Total		353	100.0

65 years and older

1	(4) Hypertension	32	14.3
2	(39) Emphysema, chronic bronchitis, COPD	16	7.1
3	(1) General medical examination	14	6.3
4	(14) Diabetes mellitus	12	5.4
5	(9) Medical and surgical aftercare	10	4.5
6	(13) Ischemic heart disease	9	4.0
7	(15) Degenerative joint disease	8	3.6
8	(2) Acute upper respiratory tract infection	7	3.1
8	(11) Acute lower respiratory tract infection	7	3.1
8	(59) Congestive heart failure	7	3.1
11	(8) Acute sprains, strains	6	2.7
11	(32) Fibrositis, myalgia, arthralgia	6	2.7
13	(43) Prostatitis, prostatic hypertrophy	5	2.2
14	(53) Skin keratosis	4	1.8
15	(7) Lacerations, contusions, abrasions	3	1.3
15	(80) Chronic skin ulcer	3	1.3
Residual		75	33.5
Total		224	100.0

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### Survey Highlights - Data Summary

In the course of the survey, it was determined that some of the data collected would be of value in themselves and as a basis for future research. Selected comparisons are made, as a matter of information only, between the data collected in this survey and data resulting from the 1980-81 NAMCS. Where comparisons with NAMCS data are made, the NAMCS data are derived from office visits to general and family practitioners classified as "other" (partnership, group and other types of practice. Solo practitioners are excluded). This classification of type of practice was observed to most closely approximate that at the MAMC Department of Family Practice.

#### Patient Demographics

Among the 1,459 patients whose visits were recorded in the MAMC survey, 607 (41.6%) were males and 853 (58.4%) were females. Visits were distributed as shown in Table 4.

Remarkable is the high percentage of male visits in the under 15 age group. A review of the diagnosis clusters revealed most of the male visits in this age group were for general medical exams, upper and lower

respiratory tract infections, and otitis media. An increase in the number of visits related to hypertension contributed to the increased percentage of male visits after the age of 44. The high percentage of female visits in the 25-44 year age group is primarily due to pregnancy-related care. General medical exams and depression were also among the most frequent reasons for visits by women in this age group. General medical exam, hypertension, depression, and degenerative joint diseases were the most predominant diagnoses among women in the 45-64 year age group. The relative frequency of male visits in the 15-44 year age groups may reflect a male predisposition to delay visits until an acute episode requires care by a physician.

#### Continuity of Care

The key to the success of family practice is continuity of care -- the family member sees the same physician for all problems (Perry, 1975). The MAMC survey data reflect 85.6% of the visits identified as follow-up visits were with the same physician who had seen the patient previously. This is indicative of a commitment among the staff and residents to continuity of care and recognition of the value of the physician-patient relationship. Although families are empanelled

TABLE 4. Number and percent distribution of visits by patient age and sex, MAMC Department of Family Practice  
11 March - 10 April 1987

Age	Male		Female	
	n	% of male visits	n	% of female visits
Under 15 years	212	(34.9%)	172	(20.2%)
15 - 24 years	65	(10.7%)	128	(15.0%)
25 - 44 years	62	(10.2%)	244	(28.6%)
45 - 64 years	143	(23.6%)	209	(24.5%)
Over 64 years	125	(20.6%)	99	(11.6%)
Total	607	(100.0%)	852	(100.0%)

to designated physicians upon entering the family practice program, the nature of the program as a physician training base is such that the high percentage of follow-up visits to the same physician was a welcome confirmation of stated goals.

#### Resource Utilization

The MAMC survey showed routine lab tests were ordered in 25.4% of the visits and x-rays in 11.3% of the visits. NAMCS rates were 25.3% and 9.0%, respectively. MAMC physicians routinely have blood pressure checks performed as part of the screening by clinic ancillary staff prior to

each visit. NAMCS recorded blood pressure checks in only 41.5% of their visits. More than 16% of the encounter forms (245) indicated diagnostic tests other than x-rays, routine clinical lab tests, and blood pressure checks. These tests were identified and compared with NAMCS data as presented in Table 5.

The MAMC totals for pap tests may be underreported due to failure of physicians to note them as separate procedures when performing a normal exam.

MAMC family practice physicians wrote prescriptions for one or more drugs in 49.1% of the visits recorded in this survey, a remarkably lower percentage than the 72.9% rate recorded under NAMCS.

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TABLE 5. Percent Distribution of diagnostic tests, MAMC and NAMCS

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Test	MAMC	NAMCS
ECG	2.1	2.8
Pap test	2.0	3.9
Tympanogram	1.6	N/A
Mammogram	0.8	N/A
Other	10.3	7.2
Total	16.8	13.8

---

### Referrals to other Specialties

MAMC family practitioners referred patients to providers in other specialties in 7.8% of the visits recorded during the survey. This compares to a NAMCS-cited referral rate of 3% to other specialties. The higher referral rate at MAMC may be due to its nature as a training program and its proximity to excellent resources among the other specialties at MAMC.

The specialties to which patients were most frequently referred are identified in Table 6.

### Research Question 1: Differences in Encounter

#### Times Due to Diagnoses

It was hypothesized that there would be a significant difference in encounter times as a result of the attributes associated with different diagnoses, that is, differences in the clinical responses invoked - cognitive processes, the types of diagnostic tests and therapies ordered, and the general services rendered. The data were analyzed based on the top 20 diagnosis clusters (encounters combined from all physician groups,  $n = 915$ , see Table 2), which represented 64.7% of all encounters. The most frequent of the clusters included

TABLE 6. Percent distribution of referrals to other MAMC specialties

Specialty service	Percent	Cumulative percent
OB/GYN	13.4	13.4
ENT	12.5	25.9
General Surgery	8.9	34.8
Orthopedics	7.1	42.0
Ophthalmology	7.1	49.1
Cardiology	5.4	54.5
Urology	5.4	59.8
Neurology	5.4	65.2
Dermatology	4.5	69.6
Vascular Surgery	4.5	74.1
Physical Therapy	3.6	77.7
Gastrointestinal Clinic	3.6	81.3
Social Work Service	3.6	84.8
Allergy Clinic	3.6	88.4
Psychiatry	2.7	91.1
Other	9.9	100.0

in the analysis accounted for 8.6% of all encounters, and the least frequent accounted for 1.2% of all encounters. The mean encounter time for the 915 encounters represented by the top 20 clusters was 19.0 minutes. Application of the analysis of variance technique to the data resulted in significant differences in encounter times by diagnosis.

Null Hypothesis  $H_0: \alpha_1 = \alpha_2 = \dots, \alpha_1 = 0$

Alternative Hypothesis  $H_A$ : not all  $\alpha_1 = 0$

Level of significance  $\alpha = .05$

Critical value,  $F_c = F_{.95, 19, 895} = 1.57$

---

TABLE 7. Analysis of variance: encounter times by diagnosis

---

Source of Variation	Sum of Squares	DF	Mean Square	F ratio	F prob
Between groups	16578.56	19	872.56	4.95	.0000
Within groups	157855.76	895	176.36		
Total	174434.32	914			

---

As expected, significant differences were observed, and the null hypothesis was rejected. Duncan's Multiple Range Test was employed to identify clusters whose encounter times were significantly different from others at the .05 level. Cluster 5 (anxiety, depression,

neurosis), with a mean encounter time of 33.2 minutes, took significantly more time than all other clusters. This difference is probably attributable to the time consuming aspects of therapeutic listening and counseling associated with the diagnosis. Cluster 11 (acute lower respiratory tract infections) was less time consuming than cluster 5, but significantly longer than clusters 2, 3, 4, 6, 7, 9, 16 and 20. At the other end of the spectrum, cluster 6 (otitis media) was significantly shorter than clusters 1, 3, 4, 5, 28, and 39. Figure 1 graphically illustrates the difference in encounter times by the top 20 clusters. The complete data identifying differences and other statistical properties of the clusters are presented in Tables 8 and 9. The data clearly indicate that, in this setting, diagnosis has a profound effect on encounter times.

#### Research Question 2: Differences in Encounter Times

##### Due to Physician Level of Training

The second hypothesis was that encounter times would differ significantly as a result of the physician level of training (PG2, PG3, staff). An analysis of variance was performed analyzing the same data as was used in the 1st research question (top 20 clusters,  $n = 915$ ). Diagnosis category was not considered in this analysis.



# Mean Time Spent per Encounter for top 20 diagnosis clusters

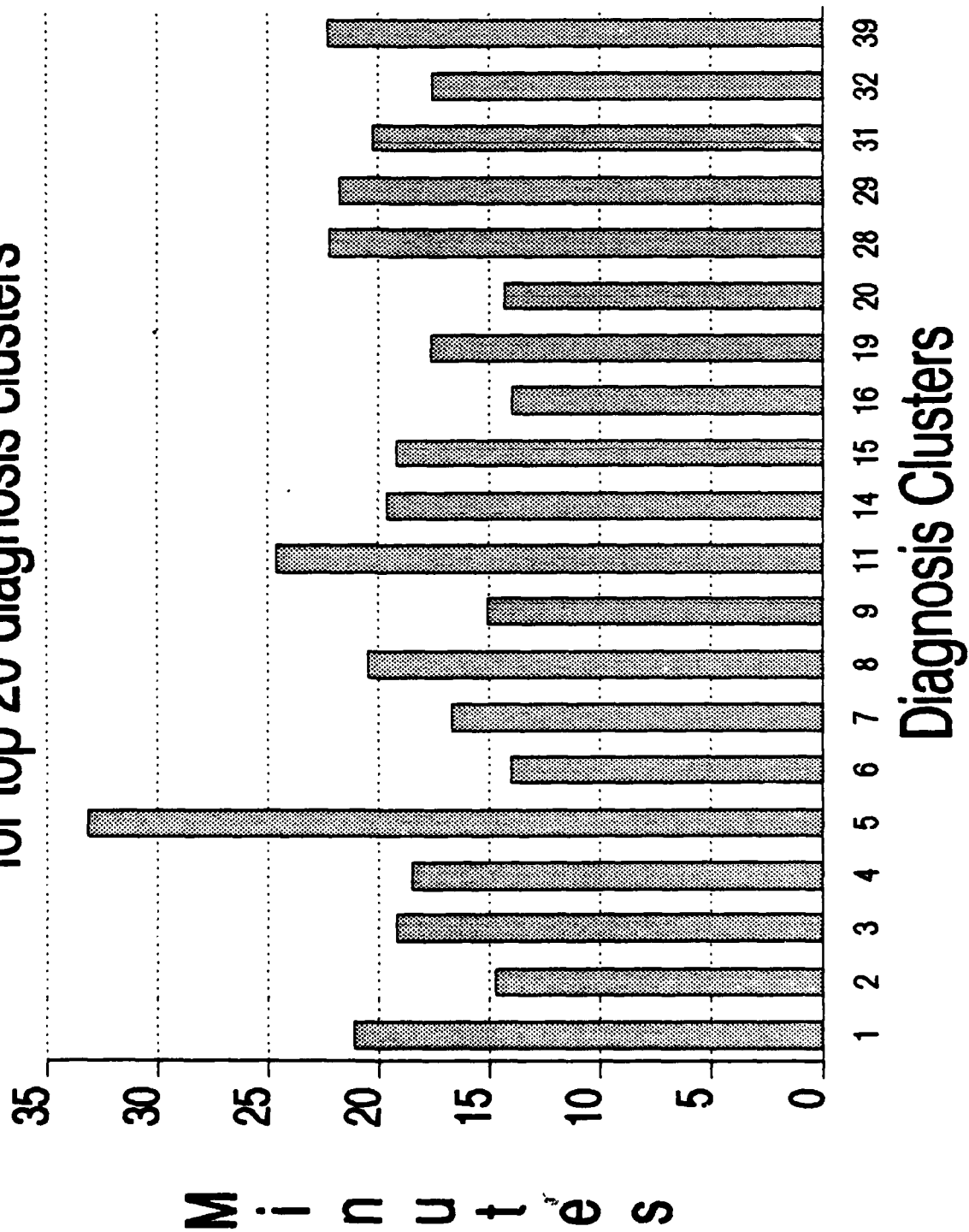


FIGURE 1

TABLE 8

SPSS/PC+

----- O N E W A Y -----

Variable T5                      Time spent during this encounter (in min  
By Variable DIAG                  Diagnosis cluster

## Multiple Range Test

## uncan Procedure

anges for the .050 level -

2.78	2.93	3.01	3.09	3.15	3.20	3.24	3.27	3.30	3.33
3.35	3.37	3.38	3.40	3.41	3.42	3.45	3.46	3.46	

The ranges above are table ranges.

The value actually compared with Mean(J)-Mean(I) is..

$$9.3908 * \text{Range} * \text{Sqrt}(1/N(I) + 1/N(J))$$

\*) Denotes pairs of groups significantly different at the .050 level

Mean	Group	6	6	0	2	9	7	2	9	4	3	5	4	1	8	1	9	3	9	1	5
14.0000	Grp16																				
14.0278	Grp 6																				
14.3478	Grp20																				
14.7590	Grp 2																				
15.1136	Grp 9																				
16.7308	Grp 7																				
17.6087	Grp32																				
17.6316	Grp19																				
18.5165	Grp 4																				
19.2268	Grp 3																				
19.2308	Grp15																				
19.6429	Grp14																				
20.2381	Grp31																				
20.5172	Grp 8																				
21.1508	Grp 1																				
21.7500	Grp29																				
22.2222	Grp28																				
22.2917	Grp39																				
24.6078	Grp11																				
33.1579	Grp 5																				

TABLE 9. Top 20 diagnosis clusters by mean encounter times in ascending order.

Cluster #	Top 20 Clusters		N	S.E.M.
	Means	S.D.		
16	14.0000	4.4721	20	1.0000
6	14.0278	5.7380	108	0.5521
20	14.3478	3.1277	23	0.6522
2	14.7590	4.0503	83	0.4446
9	15.1136	8.1760	44	1.2326
7	16.7308	10.3868	26	2.0370
32	17.6087	6.7200	23	1.4012
19	17.6316	7.1431	19	1.6387
4	18.5165	11.1429	91	1.1681
3	19.2268	13.1960	97	1.3399
15	19.2308	5.7779	26	1.1331
14	19.6429	9.3223	28	1.7617
31	20.2381	9.1482	21	1.9963
8	20.5172	10.2072	29	1.8954
1	21.1508	9.3630	126	0.8341
29	21.7500	8.1556	20	1.8236
28	22.2222	9.1108	18	2.1474
39	22.2917	11.8852	24	2.4261
11	24.6078	28.1219	51	3.9379
5	33.1579	37.7835	38	6.1293
Total Cases =			915	

Null Hypothesis  $H_0: \beta_1 = \beta_2 = \dots, \beta_j = 0$

Alternative Hypothesis  $H_A$ : not all  $\beta_j = 0$

Level of significance  $\alpha = .05$

Critical value,  $F_0 = F_{.95, 2, 912} = 3.00$

TABLE 10. Analysis of variance: encounter times by level of training

Source of Variation	Sum of Squares	DF	Mean Square	F ratio	F prob
Between groups	64.18	2	32.09	.1678	.8455
Within groups	174370.10	912	191.20		
Total	174434.32	914			

The analysis showed there were no significant differences in encounter times between physician groups by level of training, and the null hypothesis was accepted.

Differences in Encounter Times Due to Interactions between Diagnoses and Physician Level of Training

The third set of hypotheses addressed the interaction of the effects tested in Research Questions 1 and 2.

Null Hypothesis  $H_0: (\alpha\beta)_{1j} = 0$

Alternative Hypothesis  $H_A$ : not all  $(\alpha\beta)_{1j}$  are equal

Level of significance  $\alpha = .05$

Critical value,  $F_{\alpha} = F_{.95, 38, 855} = 1.39$

TABLE 11. Analysis of variance: encounter times by level of training and diagnosis

Source of Variation	Sum of Squares	DF	Mean Square	F ratio	F prob
Main effects	16705.315	21	795.491	4.700	.000
Diagnosis	16641.135	19	875.849	5.175	.000
level of tng	126.754	2	63.377	.374	.688
2-way interaction (Diag, level of tng)	13032.232	38	342.953	2.026	.000
Explained	29737.547	59	504.026	2.978	.000
Residual	144696.770	855	169.236		
Total	174434.317	914	190.847		

The analysis indicated that there is an interaction between diagnosis and level of training, resulting in a combined effect on encounter times at the .000 level of significance, even though the one way analysis of variance for physician level of training alone showed insignificant differences. Significance here means that, for certain diagnosis clusters, level of training did have an effect on encounter times. In this study, the number of encounters within any one diagnosis cluster were insufficient to establish significant differences in

encounter times attributable to the interaction between clusters and level of training. However, examination of several clusters displayed a trend which suggested the effect of level of training on encounter times. General medical exams (cluster 1) and pregnancy-related care (cluster 3) resulted in longer encounter times as level of training progressed. Upper respiratory tract infections, otitis media, and medical/surgical aftercare (clusters 2, 6, 9), took progressively less time as the level of training increased.

#### Other Factors Related to Encounter Times

In summarizing the data, factors other than diagnosis category and physician level of training were identified. These factors are discussed briefly.

#### Physician Subjective Determinations

The established length of an appointment in the Department of Family Practice is usually 15 minutes. A frequency distribution of actual encounter times were performed, incorporating the entire 1,459 recorded visits. Encounter times are compared with those reported in the NAMCS. Recorded times are reflected in Table 12.

Figure 2 graphically depicts these data. As can be seen, the greater percentage of MAMC visits do fall within the established appointment parameter, but there

TABLE 12. Percent distribution of time spent per encounter (MAMC v. NAMCS)

Time Spent	% of total encounters	
	MAMC	NAMCS
0-5 minutes	2.7	17.1
6-10 minutes	13.6	36.7
11-15 minutes	44.1	29.0
16-30 minutes	34.2	15.8
over 30 minutes	5.5	1.4

is a dramatic difference between the MAMC and the NAMCS percentages in the 0-10 minute categories, with more than 50% of the NAMCS visits taking 10 minutes or less. Part of the difference may be attributable to the teaching function associated with the MAMC family practice program. Much of the difference, however, may be due to the economics associated with high patient volume afforded by shorter visits. The length of a visit clearly has a profound effect on physician productivity, but it may also be related to patient satisfaction and affect quality of care (Rosenblatt, et al., 1982).

# Distribution of Time Spent per Encounter

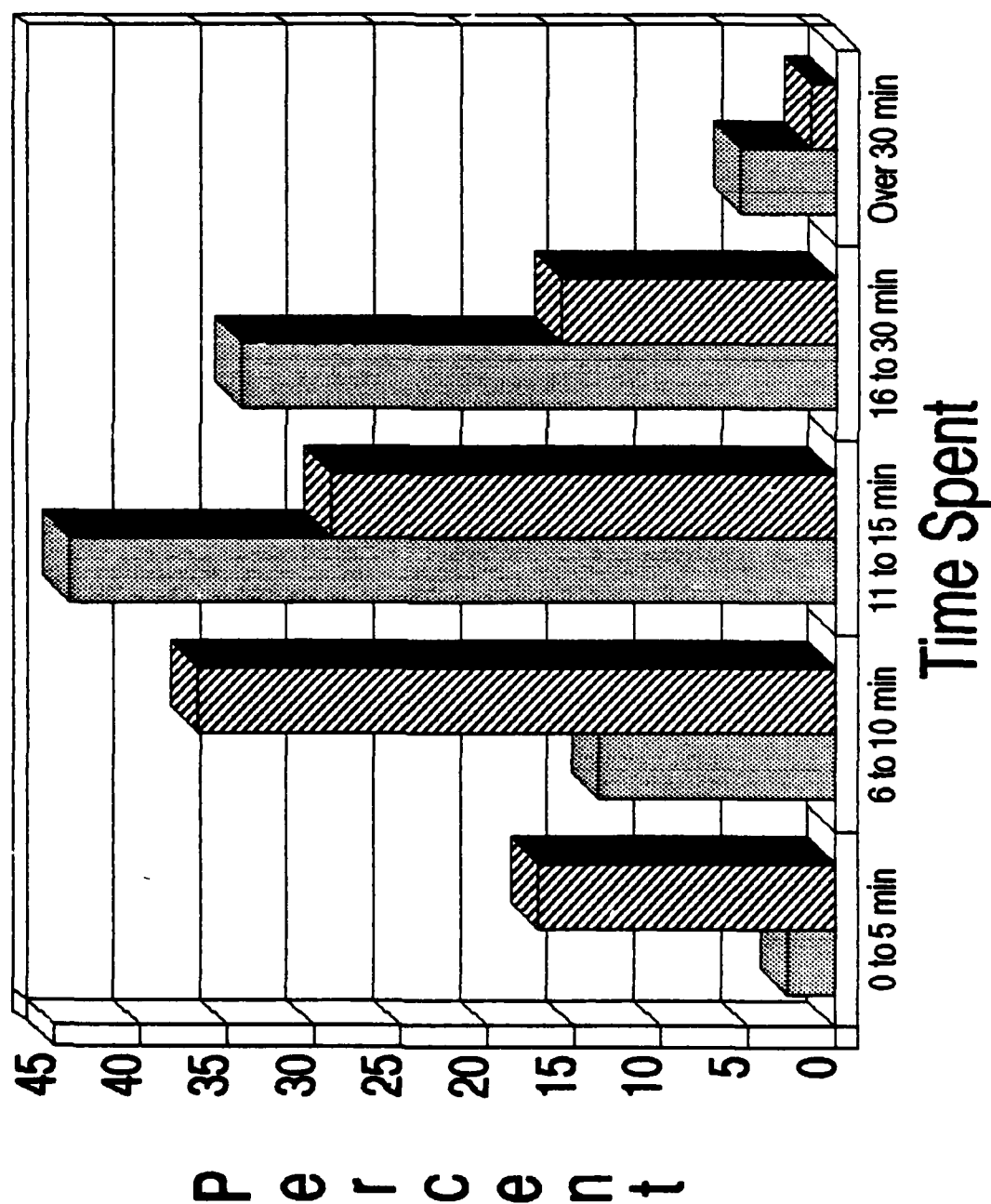


FIGURE 2



In an effort to identify variables that might result in visits which exceed normal appointment items, MAMC physicians were requested to subjectively identify any unusual circumstances resulting in a longer visit than would ordinarily be expected, given the diagnosis. Out of 1,459 forms, 260 (17.8%) cited circumstances leading to lengthy visits. Patients presenting multiple problems was, by far, the most frequently cited reason for lengthy visits. It was cited in 154 of the responses, or 10.6% of the total number of encounters. The complete list of responses is provided in Table 13.

#### Pediatric v. Adult Patients

Almost 75% of all encounters involving patients under 15 years of age lasted 15 minutes or less, with mean encounter times of 15.7 minutes, representing about three quarters of the average encounter time allocated to adults. This finding is consistent with encounter times reported in the literature (Rosenblatt et al., 1982).

#### Initial v. Follow-up Visits

It was expected that initial visits would be more time consuming than follow-up visits due to the physician's need to gather historical data or to

TABLE 13. Factors contributing to unusually lengthy visits.

Reason	Frequency	Percent	Valid Percent	Cum Percent
Patient presents multiple problems	154	10.6	59.2	59.2
Patient education	42	2.9	16.2	75.4
Office procedure	38	2.6	14.6	90.0
Patient admitted	6	.4	2.3	92.3
Lab results not in chart	5	.3	1.9	94.2
No chaperone	3	.2	1.2	95.4
Medical supplies	3	.2	1.2	96.5
No patient record	2	.1	.8	97.3
Language comprehension	2	.1	.8	98.1
Telephone problems	2	.1	.8	98.8
X-rays required	2	.1	.8	99.6
Staff shortage	1	.1	.4	100.0
TOTAL	260	17.8	100.0	

determine the diagnosis and provide initial treatment. Instead, the survey data showed an insignificant difference. Table 14 shows the comparative distribution of visit times.

TABLE 14. Percent distribution of time spent per encounter (initial v. follow-up)

Time Spent	% of total encounters	
	initial	follow-up
0-5 minutes	2.7	2.6
6-10 minutes	13.0	14.2
11-15 minutes	44.4	43.7
16-30 minutes	34.9	33.4
over 30 minutes	5.0	6.0
Total	100.0	100.0

A review of the top 20 diagnosis clusters (see Table 2 and Figure 3) revealed nine in which the follow-up visit was longer than the initial visit. Follow-ups for cluster 5 (anxiety, depression, neurosis) were markedly more time consuming than initial visits in that cluster (mean times of 37.9 and 28.4 minutes), and more time consuming than follow-ups in the other clusters. Clusters 9, 31, and 32 (medical/surgical aftercare, sinusitis, fibrositis) also experienced much longer follow-up times.

# Mean Time Spent per Encounter for top 20 diagnosis clusters

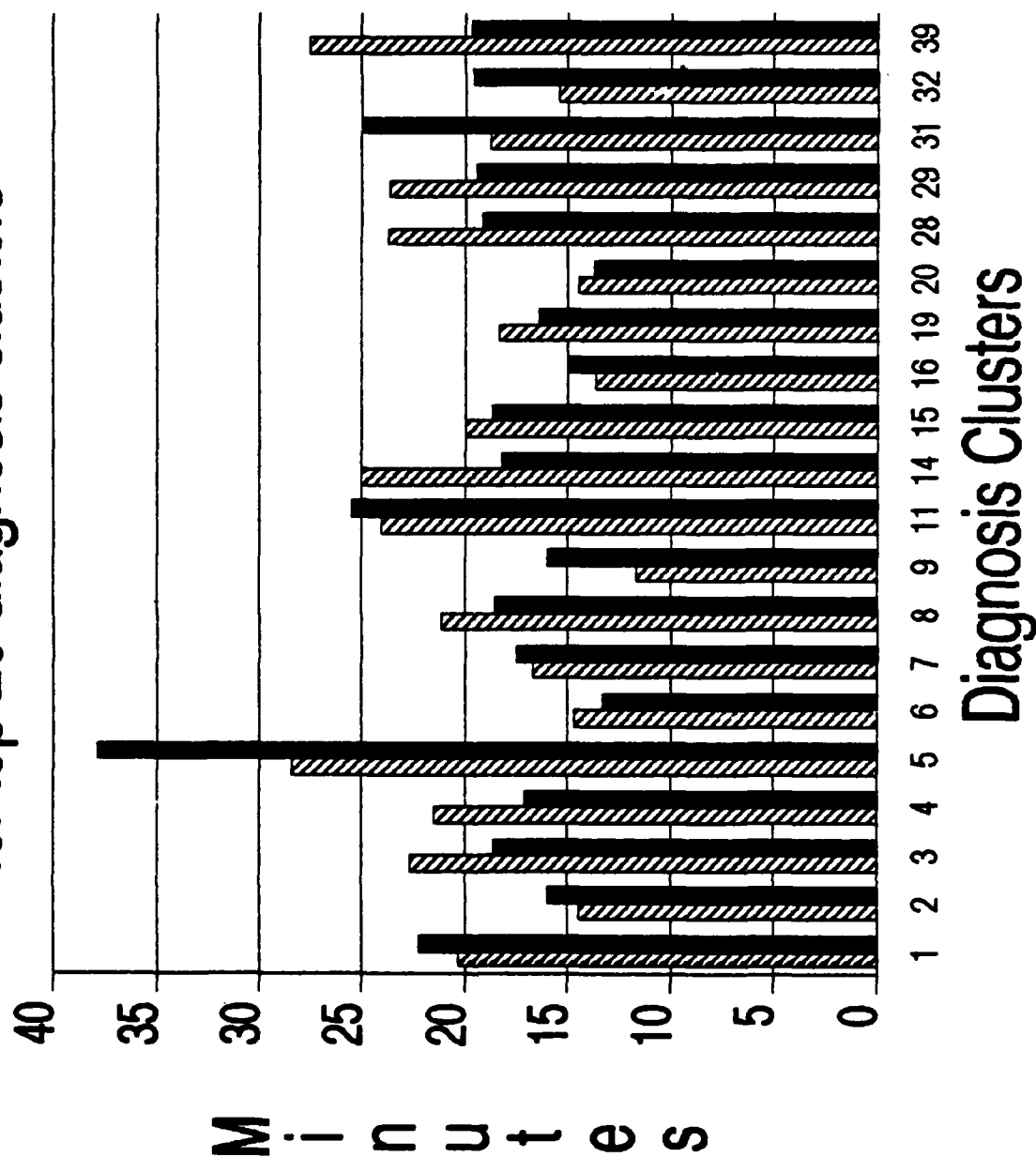
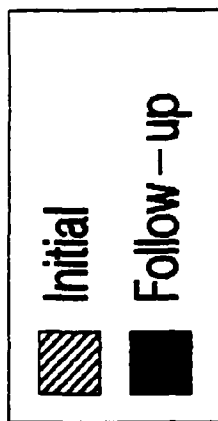


FIGURE 3



### Physician Professional Identification

Of the 20 physicians who participated in the study, seven were trained as doctors of osteopathy (DO) and 13 medical doctors (MD). Some observers speculated that differences in encounter times, if any, may be partially attributable to the different philosophical approaches to health care between DOs and MDs. Among the 1459 encounters, 468 (32.1%) were completed by DOs and 991 (67.9%) by MDs. Mean encounter times were 19.7 and 19.3 minutes, respectively. A frequency distribution was performed, with results as shown in Table 15.

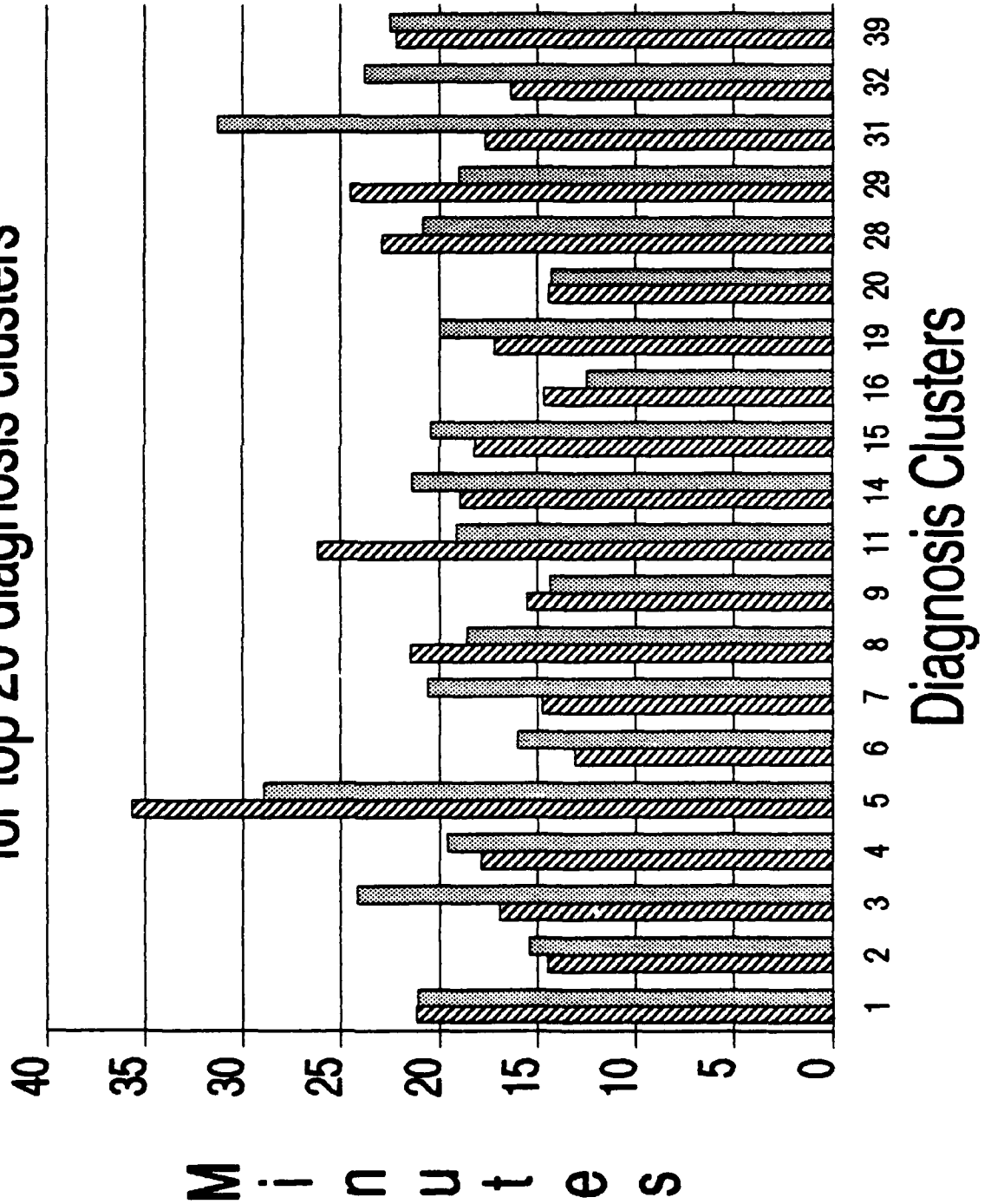
A review of the top 20 diagnosis clusters (see Table 2 and Figure 4) revealed three clusters (3, 31, and 32; pregnancy care, sinusitis, and fibrositis) in which there were pronounced differences, DOs taking longer. MDs took longer in clusters 5, 11, and 29 (depression, anxiety, neurosis; lower respiratory infections; asthma). There were no remarkable differences among the remaining clusters.

**TABLE 15. Percent distribution of time spent per encounter (DO v. MD)**

Time Spent	% of total encounters	
	DO	MD
0-5 minutes	1.5	3.2
6-10 minutes	10.7	14.9
11-15 minutes	49.4	41.6
16-30 minutes	32.5	35.0
over 30 minutes	6.0	5.2
Total	100.0	100.0

FIGURE 4

# Mean Time Spent per Encounter for top 20 diagnosis clusters



### III. CONCLUSIONS AND RECOMMENDATIONS

The classification of 92.9% of recorded encounters into diagnosis clusters in the MAMC Department of Family Practice survey compares favorably with the 90% expected classification rated cited elsewhere in this paper. The 7.1% of visits which were excluded from clusters also represented criteria consistent with expectations. These data indicate that use of the diagnosis clusters approach to categorizing diagnoses in this application is appropriate. Moreover, the problem statement goal, as reformulated in the research questions, was met by use of the diagnosis clusters, demonstrating that significant productivity data can be gathered while maintaining a manageable number of diagnosis classifications. Level of training, although insignificant as a single factor, has a demonstrable effect on encounter times when measured in conjunction with diagnosis categories. Diagnosis has a profound effect on encounter times in the ambulatory setting. The development of any ambulatory care measure of productivity must recognize this fact, if resources, based on productivity, are to be appropriately allocated.

In the course of this study, a wealth of additional information was harvested, much of which represents the



potential for extensive research in new areas. Patient age was clearly a factor in encounter times and percentage of encounters. The effect of physician professional identity on encounter times is one area that may prove to be of significant interest. More than 32% of the encounters in this survey were with DOs. Comparative information was not found in the 1980-81 NAMCS, but advance data from the 1985 NAMCS indicates 5.6% of all visits recorded in that survey were with DOs. Does this indicate a significant difference in physician distribution by professional identity in the Army? If so, why? Does it have any potential bearing on the development of physician productivity measures in the military ambulatory clinic setting? These are questions that will be left for someone else to address.

Input of the data from the encounter forms involved a total of approximately 37,000 manual data entries, which soon became drudgery. The investigator heartily recommends the development of a mark-sense form for any future studies involving such a large amount of data.

**APPENDIX A**

**DEPARTMENT OF FAMILY PRACTICE  
STAFFING/PANELS**

**DEPARTMENT OF FAMILY PRACTICE  
STAFFING/PANELS**

<b>CATEGORY FAMILIES</b>	<b>ASSIGNED</b>	<b># FAMILIES</b>	<b>TOTAL</b>
<b>PGY 1</b>	<b>5</b>	<b>25</b>	<b>125</b>
<b>PGY 2</b>	<b>7</b>	<b>75</b>	<b>675</b>
<b>PGY 3</b>	<b>6</b>	<b>150</b>	<b>900</b>
<b>FELLOW</b>	<b>4</b>	<b>30</b>	<b>120</b>
<b>STAFF</b>	<b><u>7</u></b>	<b>175</b>	<b><u>1225</u></b>
<b>TOTALS</b>	<b>28</b>		<b>2845</b>

**SOURCE: MAMC Department of Family Practice**

**APPENDIX B**

**FAMILY CATEGORY DEMOGRAPHICS**

# FAMILY CATEGORY DEMOGRAPHICS

	# SPONSORS	% TOT SPONSORS	# FAMILY MEMBERS	% TOT FAMILY MEM
Active Army				
Enlisted	563	20.84	2110	24.95
Officer	398	14.73	1471	17.39
Active Navy				
Enlisted	6	.22	36	.42
Officer	0	0	0	0
Active Air Force				
Enlisted	254	9.40	925	10.98
Officer	42	1.55	167	1.97
Retired Army				
Enlisted	707	26.17	1880	22.23
Officer	311	11.51	765	9.05
Retired Navy				
Enlisted	29	1.07	78	.92
Officer	15	.55	37	.43
Retired Air Force				
Enlisted	248	9.18	683	8.08
Officer	129	4.77	301	3.56
Totals				
		Active Duty	1263	
		Dependents	3424	47%
		Retired	1440	
		Dependents	2330	53%

SOURCE: MAMC Department of Family Practice

APPENDIX C

FAMILY DEMOGRAPHICS (AGE/SEX)

# FAMILY DEMOGRAPHICS (AGE/SEX)

AGE	FEMALE	MALE	COMBINED	%
0-1	61	75	136	2
2-14	876	950	1826	21
15-20	434	418	852	10
21-40	1198	1141	2339	28
41-60	1014	959	1973	23
61 +	586	745	1331	16
TOTAL	4169	4288	8457	100

SOURCE: MAMC Department of Family Practice

**APPENDIX D**

**FAMILY PRACTICE TRAINING PROGRAM COMPARISONS**



# FAMILY PRACTICE TRAINING PROGRAM COMPARISONS

	AD/TOTAL BENEFICIARIES	RESIDENTS/ FAMILIES (PGY1/2/3)	FACULTY/ FAMILIES	AD/RET \$	FP	STAFF* GMO	PA
GORDON	10,000/30,000	27/(50/125/185)	10/200	55/45	4	3	8
BELVOIR	10,000/160,000	18(25/75/125)	8/150	50/50	6	0	1
BENNING	25,000/100,000	27(25/75/150)	10/150	60/40	6	0	13
ORD	23,000/94,000	18(25/75/125)	7/150	67/33	5	0	0
BRAGG	42,000/217,00	27(25/75/125)	8/150	67/33	8	0	2
MAMC	26,000/180,000	18(25/75/150)	7/175	47/53	0	0	0

\*Additional medical staff not affiliated with residency program

SOURCE: MAMC Department of Family Practice

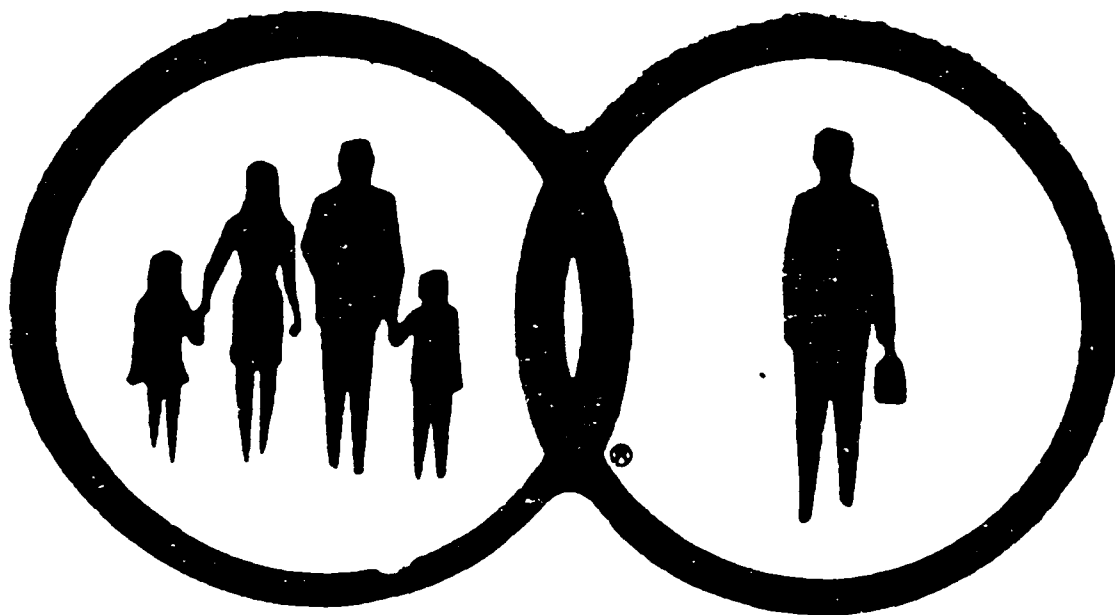
**APPENDIX E**

**MAMC DEPARTMENT OF FAMILY PRACTICE  
PATIENT INFORMATION BOOKLET**

**Madigan Army**

**Medical Center**

**Department of Family Practice**



**Tacoma, Washington**

# Department of Family Practice

## PATIENT INFORMATION PAMPHLET

WELCOME to the Madigan Army Medical Center Family Practice Program. Our goal is twofold. First, we want to make your family's health care the best and the most convenient in the U.S. Army. Our second goal is to train the very best family practitioners in the Army. Working together, we will achieve both of these goals. The purpose of this pamphlet is to provide information about our unique practice. Please read it thoroughly and ask any questions you may have.

### 1. PHONE NUMBERS:

#### EMERGENCIES:

WEEKDAYS: 0800-1630 - 967-6961  
1630-2100 - 967-7082  
2100-0800 - 967-6972 (Emergency Room)

WEEKENDS &  
HOLIDAYS: 0800-2100 - 967-7082  
2100-0800 - 967-6972 (Emergency Room)

#### URGENT PROBLEMS:

WEEKDAYS ONLY: 0800-1630 - 967-6961

#### ROUTINE APPT:

WEEKDAYS ONLY: 1000-1530 - 967-6961

PATIENTS ARE SEEN BY APPOINTMENT ONLY  
ALWAYS CALL BEFORE COMING TO THE CLINIC

ARRIVE 15 MINUTES PRIOR TO YOUR APPOINTMENT

2. The Family Practice Center is located on the South end of Ramp 6, near the Emergency Room at Madigan Army Medical Center. The reception and waiting area is in Bldg 9969-B, Clinic 1 in Bldg 9969-A, Clinic 2 in Bldg 9970-A, Clinic 3 in Bldg 9971-B and the Administrative offices in Bldg 9970-B.

3. Family Practice Residency Training Program. The Family Practice Clinics are part of the Madigan Army Medical Center, Family Practice Residency Training Program. Seventy five percent of the physicians assigned to Family Practice are residents under the supervision of fully trained Family Practice physicians. Because of this supervision, a staff physician may be requested to examine you or see you in consultation, in addition to your regular doctor. Also, you may be asked to participate in videotaping, research projects, etc., with your consent only.

4. Family Practice. The medical discipline of Family Practice encompasses the delivery of health care to the family unit. The core of knowledge associated with becoming a Family Practice physician prepares that family physician to take on the unique role of patient management, problem-solving, counseling and acting as a personal caring physician who coordinates the total health care of your family. A fully trained family physician will be able to take care of most of your family's health needs.

5. Telephone. Please refer to page 1 for our telephone numbers. The telephone numbers used during duty hours are on a "search" line that seeks an open line among three channels. Please be patient if you are unable to get through at

first; our receptionists are handling calls as fast as they can.

6. Problems that occur after duty hours. In the event of an EMERGENCY after normal duty hours, weekends or holidays, Family Practice maintains two physicians on call until 2100 hours. These physicians may be at home or they may be somewhere in the hospital caring for another family practice patient. If you need this service, contact the Medical Center Information Desk at 967-7082. The physician will be paged through a radio pager system and will call you at home. If you have not received an answer after 30 minutes, repeat this procedure. Failure by that physician to promptly answer your call is usually caused by the fact that he is engaged in an emergency. If you have a severe emergency endangering life or limb, proceed or call the Emergency Room as the illness or accident dictates. If you can call to state that you are coming, it is sometimes possible for the family physician to meet you in the Emergency Room. Members of Family Practice who do not call in first will have to wait until the family physician is notified, depending on the severity of the emergency. After talking with you (normally by telephone), he/she may determine that your problem does not need to be handled as an emergency, but can be handled by routine appointment in the Family Practice Clinic during routine duty hours. You still have the option to wait in line with other emergency room patients to see the physician who is on duty there. For any emergency that arises after 2100 hours (9:00 PM) you need not call in prior to proceeding to the Emergency Room. Family Practice call ends at 2100 hours; thereafter, all Family Practice patients will enter into the normal Emergency Room procedures. If your illness

dictates admission to the hospital, please inform the admitting physician that you are in Family Practice so we can be notified.

7. Appointments. Patients, other than emergencies, are seen by appointment only. Patients who walk in without an appointment disrupt the efficient operation of your clinic. Abuse of the appointment system is considered "INAPPROPRIATE" and will be dealt with as outlined below. (The only exception to having an appointment for emergent problem is for MAMC active duty personnel. "Sick call" for these people is at 0800 sharp. Any service member arriving after 0800 hours for non-emergent problem will be asked to call for an appointment later that day or return for sick call at 0800 hours the following day). Appointments can be made for active duty military for a problem that is keeping them from duty on the same day that they call. When you call the Family Practice Clinic for an appointment, it will be categorized as either emergent, urgent, or routine. The emergencies are seen immediately by the first available physician, nurse clinician, or physician's assistant; urgent problems are seen within 24 to 48 hours, and routine appointments are made at the first opening available with the patient's own family physician. The appointment books are opened on the afternoon of the 15th day (or first duty day thereafter) of the month for the next month. When coming to your appointment, you need to arrive at the reception desk 15 minutes prior to the appointment in order to sign in, pick up records, go to the appropriate clinic, be checked in by nursing, etc.. BRING YOUR I.D. CARD and MEDICAL CARD. Frequently, parking is a problem so allowing yourself additional time may be necessary. Due to our limited nursing personnel, we can not provide babysitting services. If you are anticipating any medical or

surgical procedure, i.e., papsmear, skin surgery, etc.; please do not bring your children with you or bring someone else along to watch them.

8. Treatment of Minors. Please accompany your minor children to the Family Practice Clinics for medical appointments. In accordance with Army Regulations and Washington State Law, we must have your consent to treat your child who is 17 years or younger. A power of attorney which is available from the Madigan Judge Advocate's Office may be used for this purpose. The only exceptions to this requirement for parental consent are for teenagers, 14 years or older, who are seeking treatment for alcohol or drug abuse or for venereal disease.

9. Cancellation of appointment. If you make an appointment with one of the physicians and are unable to keep it, please call us as far in advance as possible so that we can cancel it and use the time for other patients.

10. Waiting Room. Seating in our waiting rooms are very limited, so please do not bring additional children, friends, or relatives with you. Your cooperation will help us avoid a "PATIENTS ONLY" policy currently adopted in some clinics.

11. Social Work. A great deal of being family physicians is to be able to work with the behavioral aspects of illnesses. For that reason, Family Practice has a fulltime social worker to assist your family physician in your care and to provide counseling on an individual or group basis.

12. Prescription refills. Prescription refills are issued during office hours only. If you need a prescription renewed, please call the clinic at



least three (3) working days before you run out of your medicine. It is a Madigan requirement that all prescriptions and refills be entered into one's medical records. Therefore, sufficient time must be allowed to pull the medical records and for it to be reviewed by the physician. When you call, please have the old prescription bottle available so that you may read certain information from the prescription label to the receptionist. She/he has been instructed to ask if you are having any problems with the medication. Be frank with her/him; if you are having problems, your physician may wish to discuss them with you.

13. Phone Consults. The phone consultation service is a system by which you may call the clinic and request your family physician to call you to give specific information regarding the seriousness of your illness, for prescriptions or for follow-up appointments and medical consultation. The receptionist is required to ask you certain information and a phone number where the physician can reach you. Depending on the time of your initial call, your physician may not be able to call you that day. If you have not heard from him/her within 24 hours, call the clinic again and notify the receptionist. They will initiate a second phone consult.

14. Nursing Services. Patients may come into the clinic without a formal appointment for certain nursing services. Those available include:

a. Immunization, as requested by your physician. (measles, mumps, rubella, oral polio, TB test, diphtheria, pertussis, tetanus).

b. Blood pressure checks.

- c. Throat cultures.
- d. Suture check and removal.
- e. Cast removal ordered by physician.
- f. Height and weight check.

15. Change of Status. Please notify the Family Practice Administrative Office 967-6673 of any change in your family's status. Especially important are change of address, telephone changes, new dependents, retirement, PCS/ETS. Inability to reach patients due to changes listed above has greatly hampered the delivery of medical care in the past.

16. Hospitalization. Because of the large number of physicians in training at Madigan, your family physician may or may not be the primary physician in charge of your inpatient care. If you are admitted from the clinic, then a family physician or his assistant will fill out the necessary paperwork and direct you to the proper ward. Regardless of who your primary physician is, please have your family physician notified so that he may participate in your inpatient care. We regret and apologize for the occasional gap in our continuity of care, but as of yet have found no way to remedy the situation, but we are working on it!

17. Physical Examination. Physical examinations for active duty personnel are handled by their Troop Medical Clinic. In Family Practice, we do what is termed a database history and physical examination. This takes two separate appointments. At the first appointment (pre-physical appointment), your medical history will be discussed and baseline

laboratory tests will be ordered. At the next appointment, a minimum of two (2) weeks later, a physical will be performed and the history and lab work will be reviewed. Only after age 60 should you consider an annual physical examination. The recommended interval between complete physical exams depends on how your family physician evaluates your health. He/she will want to concentrate on your ongoing chronic medical problems and see you as often as these specific problems required.

18. Late policy. You must arrive at the reception desk a minimum of 15 minutes prior to your appointment. Allow yourself plenty of time when leaving home; you will need time to park your car and walk to the clinic. In most cases if you arrive at the clinic 15 minutes prior to your appointment, you will have time to identify yourself (YOU NEED YOUR ID CARD AND MEDICAL CARD), pick up your medical record, if necessary, sign in, and visit the nursing station. If you arrive late and can not be processed in time to keep your appointment, the receptionist will inform you of this and notify your physician. He/she may elect to see you or may request that you reschedule your appointment. In order not to disrupt the schedule of patients who have arrive on time, it is our policy to see late patients after all on-time patients have been seen.

19. Inappropriate Visits/Inappropriate Utilization. Patients who use the Family Practice Clinics inappropriately or behave in an inappropriate manner disrupt the system and we must deal with them. Inappropriate visits may occur whenever a patient does any of the following:

- a. Fails to cancel an appointment.
- b. Is late for an appointment.
- c. Walks into the clinic to see a physician for non-emergent problems.
- d. Utilizes the on-call physician for non-emergent problems.
- e. Behaves in an abusive manner to anyone on the administrative, nursing, or medical staff.
- f. Seeing health care providers or clinics, civilian or military, without the knowledge and approval of family physician will be considered inappropriate utilization and be possible grounds for removal.

Only a physician may determine that a visit is inappropriate. Each inappropriate visit will be recorded in the patient's medical record and the sponsor will be notified by letter. At this time the sponsor may discuss the inappropriate visit with his/her family physician. If the family accumulates three (3) inappropriate visits in a year or four (4) in two (2) years, or inappropriately utilizes the clinic, the family will be considered for expulsion from the Family Practice Program. The sponsor will be informed by letter and offered the opportunity to discuss the matter with the Chief, Department of Family Practice.

20. Retiree Families. Each Family Practice physician, whether he/she is a resident or staff physician, is assigned a panel of families for which he/she is responsible. We strive to maintain a 50/50 ratio between retiree and active duty families for each

physician. Many more families wish to be members of the Family Practice Program than we can accomodate, and because of this, we periodically develop a waiting list. Since retiree families do not move as frequently as active duty, we have strived to develop a fair system for these families. This system has been developed in consultation with the Commander, Madigan Army Medical Center, the Madigan Health Consumer Council, the Ft Lewis Retiree Council, and the McChord Retiree Council. The system is as follows: Each year as physicians are reassigned to new stations, the retiree families on the panels of these physicians will be dropped from the Family Practice Program if they have been in Family Practice for a minimum of three (3) years. The sponsor of each of these families will be notified in writing and offered the opportunity to appeal this decision to the Chief, Department of Family Practice in writing. As new physicians are assigned, new retiree families from the waiting list will be assigned. As the waiting list is exhausted, a new list will be established.

21. Changing physicians. From time to time, patients may become dissatisfied with their assigned family physician and wish to be reassigned to a new physician. When these dissatisfactions occur, please discuss them with your family physician. If the conflict can not be resolved by you and your doctor, the sponsor may request an appointment with the Clinic Chief through the secretary. An interview will be conducted to determine, and if possible remove any sources of patient dissatisfaction. The Clinic Chief will bring the matter to the attention of the doctor concerned, and arrange a meeting between the physician, his patient and the patient's sponsor, in an attempt to resolve any differences that may interfere with patient care. Changing

of physicians is not encouraged, but is occasionally quite appropriate, and only one change will be allowed while you are a member of this program. Of course, patients always have the option of withdrawing from Family Practice and seek care from other clinics at Madigan Army Medical Center. We feel that these provisions are necessary, especially for active duty personnel as in the military system of health care, they have relatively little choice over their physician as compared to the civilian community. Furthermore, we realize that we can't please all the people all of the time. Physicians learn from many sources, but they learn most from their patients, so please don't try to spare us if you feel that you have a legitimate complaint or personal conflicts with your doctor.

22. EPILOGUE. The family practitioner of the present is a marriage of the personal continuous care provided by the general practitioner of the past with the updated knowledge and skills possessed by the physician of the present. Your family physician is devoted to the health and welfare of you and your family from birth to grave. He has been well trained, or is currently training in all aspects of medical care, including medicine, pediatrics, obstetrics and gynecology, surgery, as well as public health, special problems of the aged, and psychiatry. Do not be surprised if he is able to talk with you about sexual dysfunction as fluently as your hypertension, or special problems of growth and development in infants and adolescents, or your aging parents, or your pregnancy, or your upcoming surgery. Do not be surprised to find him tired and unreasonable from time to time as he or she is only human. Through our mutual cooperation, we hope to provide you with the latest in health care, which we feel is a right and not a privilege of every human being, for your longevity and well being.

REMINDERS!

1. You will be seen by appointment only, except in emergencies.
2. If you have an emergency, call first so we can be ready for you.
3. Arrive at least 15 minutes before your appointment.
4. Cancel any appointments you can not make.
5. Notify the clinic of any address or telephone number changes, or changes of your status.
6. Your family practice physician wants to be the coordinator of all your family's health needs. If you are being seen outside of Family Practice, please let him/her know.

**APPENDIX F**

**FAMILY PRACTICE PHYSICIAN CLINIC AVAILABILITY**



# **FAMILY PRACTICE PHYSICIAN CLINIC AVAILABILITY**

<b>STAFF</b>	<b>32 Hours/Week</b>
<b>FELLOWS</b>	<b>4 Hours/Week</b>
<b>PGY 1</b>	<b>4 Hours/Week</b>
<b>PGY 2</b>	<b>12 Hours/Week</b>
<b>PGY 3</b>	<b>20 Hours/Week</b>

**PGY 1 appointments at 20 minute intervals; all others at 15 minute intervals with exceptions made for minor procedures or DO manipulations.**

**SOURCE: MAMC Department of Family Practice**

APPENDIX G

MAMC FAMILY PRACTICE CLINIC VISITS

MAY 1986 - APRIL 1987

# FAMILY PRACTICE CLINIC VISITS

MAY 86	3,576
JUN 86	3,394
JUL 86	3,466
AUG 86	3,163
SEP 86	3,213
OCT 86	3,809
NOV 86	3,186
DEC 86	3,251
JAN 87	3,581
FEB 87	3,469
MAR 87	3,719
APR 87	4,309

Clinic visits include immunization, telephone consults, requests for prescription refills, diabetic counseling, obstetric and clinic orientations and physician encounters.

SOURCE: MAMC Department of Family Practice

**APPENDIX H**

**PHYSICIAN REGISTRATION FORM**

**PHYSICIAN REGISTRATION FORM**

PHYSICIAN I.D. NUMBER: \_\_\_\_\_

PHYSICIAN CATEGORY:

staff \_\_\_\_\_

fellow \_\_\_\_\_

resident: PGY 3 \_\_\_\_\_ PGY 2 \_\_\_\_\_

PROFESSIONAL IDENTITY:

D.O. \_\_\_\_\_ M.D. \_\_\_\_\_

board certified? yes \_\_\_\_\_ no \_\_\_\_\_

specialty(s) \_\_\_\_\_

APPROXIMATE NUMBER OF HOURS PER WEEK YOU ARE AVAILABLE FOR DIRECT PATIENT CONTACT (OUTPATIENT)  
IN YOUR CLINIC AT THIS FACILITY: \_\_\_\_\_

DO YOU HAVE INPATIENT CARE RESPONSIBILITIES? yes \_\_\_\_\_ no \_\_\_\_\_

IF YES, APPROXIMATELY HOW MANY HOURS PER WEEK ARE DEVOTED TO INPATIENT CARE? \_\_\_\_\_

APPROXIMATE NUMBER OF HOURS PER WEEK DEVOTED TO NON-CLINICAL RESPONSIBILITIES AT THIS FACILITY:

teaching \_\_\_\_\_

department/service administrative tasks \_\_\_\_\_

committee meetings \_\_\_\_\_

continuing/graduate medical education \_\_\_\_\_

military training \_\_\_\_\_

other (please explain): \_\_\_\_\_

**APPENDIX I**

**FAMILY PRACTICE PHYSICIAN-OUTPATIENT ENCOUNTER FORM**

**FAMILY PRACTICE PHYSICIAN - OUTPATIENT ENCOUNTER FORM**

PLEASE CIRCLE THE APPROPRIATE RESPONSE OR FILL IN THE BLANK.

CLINIC ANCILLARY STAFF PLEASE COMPLETE THE FIRST PORTION PRIOR TO PLACING FORM ON PT. CHART

physician i.d. number: \_\_\_\_\_ today's date: \_\_\_\_\_ - time: \_\_\_\_\_

patient's sex: male female patient's age: \_\_\_\_\_

reason for this visit (subjective): \_\_\_\_\_

**PHYSICIAN PLEASE COMPLETE THE REMAINDER OF THIS FORM**

place of visit: clinic telephone

type of appointment: scheduled walk in

type of visit: initial followup

Have you treated this patient for any reason in the past? yes no

During this visit did you order:

lab tests yes no

x-rays yes no

other diagnostic tests yes no (if yes, please identify) \_\_\_\_\_

prescription written? yes no

principal diagnosis (actual or rule out): \_\_\_\_\_

Did you consult with another family practice physician during this visit? yes no

Did you consult a provider in another department for this problem? yes no

If yes, what specialty? \_\_\_\_\_

amount of time **YOU** spent with the patient in this visit (including reviewing/completing the chart immediately prior to seeing the patient, in the presence of the patient or immediately following the patient's departure):

TIME SPENT: 5 min 10 min 15 min 20 min 30 min 45 min 1 hour

1 1/2 hour 2 hours 2 1/2 hours 3 hours 3 1/2 hours 4 hours over 4 hours

Any unusual circumstances which made this visit longer than it should have been? If so, please comment here.  
e.g., lost record, lab results not in chart, lack of chaperone, language difficulties, telephone not working,  
patient presents additional problems or complaints, etc.

APPENDIX J

DIAGNOSIS CLUSTERS DATABASE



**An Updated ICD-9-CM Diagnosis Clusters Roster Based on NAMCS  
1980 and 1981 for All Ambulatory Office-Based Specialties:  
Cross Tabulated with the International Classification of  
Health Problems in Primary Care (ICHPPC-2)**

Prepared by the NAPCRG Ad Hoc Committee on Diagnosis Clusters

Schneeweiss R, Cherklin DC, Hart LG, Revicki D, Wollstadt LJ,  
Stephenson M, Froom J, Dunn E, Tindall HL, and Rosenblatt RA

The ICD-9-CM version of the diagnosis clusters was developed by researchers at the University of Washington and is considered proprietary. The method is shared with other researchers on an "as is" basis. Commercial uses will require a special licensing agreement with the University of Washington.

All Specialty Cluster		ICD-9-CM	ICHPPC-2
Rank*	Diagnosis Cluster Title**		
1	General Medical Examination (1)	V01.0 to V07.0 V07.2 to V07.9 V20.0 to V21.9 V28.0 to V28.9 V30.0 to V37.9 V39.0 to V39.9 V65.5 V70.0 to V72.6 V72.8 to V82.9	V70-,V01-,V03-
2	Acute Upper Respiratory Infection (2)	034.0 460.0 to 460.9 462.0 to 465.9 475.0 to 475.9 487.1 to 487.9	034-,460-,463-, 464-, 487-
3	Pregnancy Care and Abortion (3)	630.0 to 631.9 632.0 to 639.9 640.0 to 646.4 646.7 to 646.9 650.0 to 659.9 664.0 to 664.9 666.0 to 666.9 669.0 to 671.2 672.0 to 676.2 V22.0 to V24.9	V223,V220,V24-, 633-,634-,636-, 640-,642-,648-, 650-,661-

\*The cluster rank refers to the rank order based on primary diagnoses for all office-based specialties, NAMCS 1980+1981.

\*\*The number in parenthesis ( ) refers to the cluster rank in the original diagnosis cluster roster published in Medical Care, 1983; 21:101-121, 1983. This was based on NAMCS 1977 & 1978 data for all office-based specialties and coded in ICDA-8.

All  
Specialty  
Cluster

<u>Rank</u>	<u>Diagnosis Cluster Title</u>	<u>ICD-9-CM</u>	<u>ICHPPC-2</u>
4	Hypertension (4)	401.0 to 405.9 437.2 796.2	401-,402-,796.2
5	Depression, Anxiety, and Neuroses (5)	300.0 to 300.9 302.7 306.0 to 306.9 307.6 to 307.7 308.0 to 309.9 311.0 to 314.9 799.2	3000,3001,3004, 3009,3027,308-, 312-
6	Otitis Media--Acute and Chronic (11)	381.0 to 381.4 382.0 to 382.9 384.0 to 384.1	3820,3811,3815
7	Lacerations, Contusions, and Abrasions (6)	872.0 to 887.9 890.0 to 897.9 910.0 to 910.3 910.6 to 911.3 911.6 to 912.3 912.6 to 913.3 913.6 to 914.3 914.6 to 915.3 915.6 to 916.3 916.6 to 917.3 917.6 to 918.3 918.6 to 919.3 919.6 to 929.9 951.0 to 951.9 954.0 to 957.9 959.0 to 959.9	889-,912-,918-, 929-
8	Acute Sprains and Sprains (9)	840.0 to 848.9	840-,842-,844-, 8450,8451,8470, 8478,848-
9	Medical and Surgical Aftercare	V51.0 to V58.9 V67.0 to V67.9	V10-,V50-
10	All Fractures and Dislocations (13)	800.0 to 839.9	802-,805-,807-, 810-,812-,813-, 814-,816-,820-, 823-,829-,836-, 839-
11	Acute Lower Respiratory Tract Infection (10)	466.0 to 466.9 480.0 to 487.0 490.0 to 490.9	466-,486-

All Specialty Cluster	Rank	Diagnosis Cluster Title	ICD-9-CM	ICHPPC-2
	12	Acne and Diseases of the Sweat and Sebaceous Glands (18)	695.3 705.0 to 706.2 706.4 to 706.9	705-,7061,7062
	13	Ischemic Heart Disease (8)	410.0 to 414.9 429.2	410-,412-
	14	Diabetes Mellitus (15)	250.0 to 250.9 648.0	250-
	15	Degenerative Joint Disease (16)	715.0 to 717.7 717.9	715-,7161,717-
	16	Dermatitis and Eczema (12)	690.0 to 693.9 698.3 706.3	690-,6918,6910, 692-
	17	Malignant Neoplasms (excl. Skin) (20)	140.0 to 165.9 170.0 to 171.9 174.0 to 174.9 175.9 179.0 to 208.9 230.0 to 231.9 233.0 to 234.9	151-,162-,174-, 180-,188-,199-, 201-
	18	Refractive Errors (17)	367.0 to 367.9	367-
	19	Urinary Tract Infections (excl. Urethritis) (19)	590.0 to 590.9 595.0 to 595.9 599.0 646.5 to 646.6	5901,595-,6466
	20	Chronic Rhinitis (14)	472.0 472.2 477.0 to 477.9	477-
	21	Obesity (22)	278.0	273-
	22	Low Back Pain and Syn- dromes (excl. acute strain)	720.1 to 720.9 721.3 to 721.4 722.1 to 722.2 722.5 to 722.6 724.2 to 724.9	721-,7242,7244
	23	Bursitis, Synovitis, Tenosynovitis (24)	726.0 to 727.3 727.5 to 727.9	7260,7263

All Specialty Cluster	Rank	Diagnosis Cluster Title	ICD-9-CM	ICHPPC-2
	24	Peptic Diseases (29)	530.1 to 530.2 531.0 to 536.9	530-,532-,533-, 536-
	25	Benign and Unspecified Neoplasms (23)	210.0 to 229.9 235.0 to 239.9	214-,216-,217-, 218-,228-,229-, 239-
	26	Cataracts and Aphakias (32)	366.0 to 366.9 379.31* 743.3	366-
	27	Nonfungal infections of the skin and Subcut- aneous Tissue (26)	289.3 607.2 680.0 to 686.9	680-,683-,684-, 685-
	28	Vaginitis, Vulvitis, and Cervicitis (21)	112.1 131.0 616.0 to 616.1 622.0 623.5 627.3	1121,1310,6161, 622-
	29	Asthma (30)	493.0 to 493.9	493-
	30	Diarrhea, Gastroenteritis (excl. Helminthiasis) (25)	001.0 to 009.9 558.9	008-,009-
	31	Sinusitis--Acute and Chronic (28)	461.0 to 461.9 473.0 to 473.9	461-
	32	Fibrositis, Myalgia, and Arthralgia (33)	719.4 to 719.5 729.0 to 729.1 729.4 to 729.5 729.8 to 729.9	7194,728-,7295
	33	Viral Warts (37)	078.1	0781
	34	Headaches (34)	346.0 to 346.9 307.81** 784.0	3078,346-,7840

Note for computer programmers:

\*379.31 recoded as nonexistent four-digit code 366.6. Any original 366.6 codes are coded w  
the nonexistent code 366.7.

\*\*307.81 recoded as nonexistent four-digit code 346.3. Any original stray 346.3 codes are c  
with the nonexistent code 346.4.

All Specialty Cluster Rank	Diagnosis Cluster Title	ICD-9-CM	ICHPPC-2
35	Hemorrhoids, Other Peri-rectal (39)	455.0 to 455.9 565.0 to 565.9 566.0 to 566.9 569.0 to 569.2 569.4	455-,565-,5646
36	Sexually Transmitted Dis- eases and Associated Infections (excl. Vaginitis)(43)	054.1 090.0 to 092.9 096.0 to 099.9 112.2 597.8 604.0 604.9 607.1 608.0 608.4 614.0 to 614.5 614.7 to 615.9 616.3 to 616.4	090-,098-,0994, 597-,614-
37	Menstrual Disorders (31)	623.8 625.3 to 625.4 626.0 to 626.9 627.0 to 627.1	6260,6262,6253, 6269
38	Conjunctivitis and Keratitis (36)	053.2 054.4 077.0 to 077.9 130.1 370.0 to 370.9 372.0 to 372.3	077-,3720
39	Emphysema, Chronic Bronchitis and COPD (55)	491.0 to 492.9 494.0 to 494.9 496.0 to 496.9	491-,492-
40	Schizophrenia and Affective Psychosis (35)	295.0 to 296.9 298.0 298.9 to 299.9	295-,296-,298-
41	Glaucoma (48)	365.0 to 365.9	365-
42	Contraception (40)	V25.0 to V25.9	V252,V255,V251, V253,V256
43	Prostatitis and Prostatic Hypertrophy (38)	600.0 to 601.9	600-,601-

<u>All Specialty Cluster Rank</u>	<u>Diagnosis Cluster Title</u>	<u>ICD-9-CM</u>	<u>ICHPPC-2</u>
44	Personality Disorders-All (45)	301.0 to 301.9	301-
45	Rheumatoid Disease (51)	714.0 to 714.9	714-
46	External Abdominal Hernias (58)	550.0 to 551.2 551.8 to 552.2 552.8 to 553.2 553.8 to 553.9	550-,553-
47	Malignant Neoplasms of the Skin (excl. genitalia) (60)	172.0 to 173.9 232.0 to 232.9	173-
48	Peripheral Neuropathy, and Neuritis (44)	350.0 to 353.0 354.0 to 355.9 356.1 to 356.4 357.0 to 357.9 720.2	No equivalent separate code
49	Allergic Reaction NOS (-)	995.3	9950
50	Cardiac Arrhythmias (54)	427.0 to 427.9	4270,4273,4276
51	Thyroid Diseases (excl. neoplasm) (42)	240.0 to 245.9 648.1	240-,242-,244-
52	Vertiginous Syndromes (47)	386.0 to 386.9 780.4	386-,7804
53	Skin Keratoses (excl. warts) (53)	702.0 to 702.9	No equivalent separate code
54	Otitis Externa (52)	380.1, to 380.2	3801
55	Cerebrovascular Disease (50)	430.0 to 437.1 437.3 to 438.9	435-,438-
56	Menopausal Symptoms (41)	256.3 627.2 627.4 to 627.9	627-
57	Viral Exanthems (46)	051.0 to 053.1 053.3 to 054.0 054.2 to 054.3 054.5 to 057.9 074.3	052-,053-,054-, 055-,056-,057-

<u>All Specialty Cluster Rank</u>	<u>Diagnosis Cluster Title</u>	<u>ICD-9-CM</u>	<u>ICHPPC-2</u>
58	Iron and Other Deficiency Anemia (49)	280.0 to 281.9 285.9 648.2	280-,281-,285-
59	Congestive Heart Failure (63)	518.4 428.0 to 428.9	428-
60	Abdominal Pain (excl. pelvic ) (64)	789.0	7890
61	Psoriasis and Pityriasis (70)	696.0 to 696.9	6961,6963
62	Irritable Colon (72)	564.1 564.5	558-
63	Chronic Cystic Disease of the Breast (59)	610.0 to 610.9	610-
64	Infections of the Eyelids (69)	373.0 to 373.2	3730
65	Wax in the Ear (57)	380.4	3804
66	Dermatophytoses (65)	110.0 to 111.9	110-
67	Seizure Disorders (66)	345.0 to 345.9 780.3	345-,7803
68	Cholelithiasis and Cholecystitis (56)	574.0 to 576.9	574
69	Diseases of Hair and Hair Follicle (85)	704.0 to 704.9	704-
70	Thrombophlebitis (excl. pulmonary embolism) (68)	451.0 to 453.9	451-
71	Alcohol and Drug Abuse (91)	291.0 to 292.9 303.0 to 305.8 571.0 to 571.5 648.3	3031,3048,3050, 571-
72	Burns--All (61)	940.0 to 949.9	949-
73	Chest Pain (76)	786.5	7865



<u>All Specialty Cluster Rank</u>	<u>Diagnosis Cluster Title</u>	<u>ICD-9-CM</u>	<u>ICHPPC-2</u>
74	Urticaria (80)	708.0 to 708.9 995.1	708-
75	Varicose Veins Low Extremities (77)	454.0 to 454.9	454-
76	Generalized Arteriosclerosis (71)	440.0 to 440.9 443.9	440-
77	Stricture of Urethra (67)	598.0 to 598.9	No equivalent separate code
78	Renal Calculi (86)	592.0 to 592.9 594.0 to 594.9	592-
79	Infectious Mono and Viral Hepatitis (73)	070.0 to 070.9 075.0 to 075.9 573.3	070-,075-
80	Chronic Ulcer of Skin (-)	707.0 to 707.9	707-
81	Strabismus (84)	378.0 to 378.9	No equivalent separate code
82	Diverticular Disease of Colon (74)	562.1	562-
83	Allergy Test and Desensitization (-)	V07.1 V72.7	No equivalent separate code
84	Deafness (75)	387.0 to 387.9 388.2 389.0 to 389.9	387-
85	Uterovaginal Prolapse (79)	618.0 to 618.9 625.6	618-
86	Infertility (-)	606.0 to 606.9 628.0 to 628.9 V26.0 to V26.2 V26.8 to V26.9	606-
87	Helminthiasis, Scabies, and Pediculosis (90)	120.0 to 129.9 132.0 to 133.9	127-,132-,133-
88	Breast Lump (-)	611.7	611-

<u>All Specialty Cluster Rank</u>	<u>Diagnosis Cluster Title</u>	<u>ICD-9-CM</u>	<u>ICHPPC-2</u>
89	Psychosocial Problems Family and Individual (-)	V60.0 to V62.9	V602 to V629
90	Valvular Heart Diseases (Acquired) (-)	391.1 391.9 392.0 394.0 to 397.9 424.0 to 424.9	390-,424-
91	Gout (82)	274.0 to 274.9	275-
92	Adverse Effects of Medical Agents (81)	960.0 to 979.9 995.0 995.2	977-,9952
93	Diaphragmatic Hernia (78)	551.3 552.3 553.3	551-
94	Foreign Body in the eye (83)	930.0 to 930.9	930-
95	Parkinsons Disease Tremors (62)	332.0 to 333.1 333.9 781.0	332-,7810
96	Hypertrophy of the Tonsils and Adenoids (88)	474.0 to 474.9	474-
97	Ganglion (-)	727.4	7274
98	Hematuria (-)	599.7	5997
99	Lymphadenopathy (-)	785.6	7856
100	Acquired Curvature of the Spine (-)	737.0 to 737.9 788.5	737-

# SUPPLEMENTARY LISTING FOR FAMILY PHYSICIANS\*

<u>Cluster Number</u>	<u>Title</u>	<u>ICD-9-CM</u>	<u>ICHPPC-2</u>
101	Unspecified Viral Illness	079.9, 790.8	0799
102	Unexplained Abnormal Biochemistry Result	790.2 to 790.9	7902
103	Rash	782.1	7821
104	Malaise and Fatigue	780.7, 799.3	7807
105	Constipation	564.0	5640
106	Cough	786.2	7862
107	Fever of Unknown Origin	780.6	7806
108	Ingrown Toenail	703.0	703-
109	Pleurisy Without Effusion	511.0	5110
110	Edema	782.3	7823

\*Diagnostic categories with frequency greater than 0.1 percent in family physician offices otherwise excluded from cluster list.

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<p>This study was performed to establish a measure of clinical productivity among physicians in the department of Family Practice at Madigan Army Medical Center, Tacoma, Washington. This study demonstrated that significant productivity data can be gathered while maintaining a manageable number of diagnosis classifications.</p>					
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22a. NAME OF RESPONSIBLE INDIVIDUAL Major Leahy				22b. TELEPHONE (Include Area Code) (512) 221-2324/6345	
				22c. OFFICE SYMBOL	